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Specular Multipath Test for 8- and 16-Bit Codes

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Abstract

A simple means for characterizing the multipath tolerance of a system design is the specular-multipath test. While the possibilities for multipath profiles are of infinite dimension, this simple test "probes" the multipath robustness of the design with a multipath profile of managable complexity. The channel impulse response is considered to comprise a line-of-sight path and a single specular reflection trailing at a delay equal to an integer number of chip durations T_c. The test consists of indicating the probability of symbol error P_{se} vs. relative (to the LOS signal) strength of a specular multipath signal for various delays; the phase of the multipath is uniformly distributed relative to the LOS signal. The test presented herein sets the noise to zero. More generally, the effect of the multipath can be assessed by considering the curves of probability of symbol error P_{se} vs. E_S/N_0 for various cases of multipath delay and amplitude. The specular multipath test is used herein to examine the multipath performance of 8-bit spreading codes in a coherent, dual 8-ary Bi-Orthogonal system, and 16-bit spreading codes in a non-coherent 16-ary Bi-Orthogonal system. We compute the performance for the first side-lobe position, since that is the most likely position for a strong specular; however, other near-in side-lobe positions are expected to exhibit similar results. Of significance is that the use of 16-bit codes operates in the absence of noise right up to equal-strength paths, while using 8-bit codes incurs a "gap" in operation for close relative amplitudes of the multipath signals.

Specular Multipath Test for 8- and 16-Bit Codes

Specular Multipath Test

The channel impulse response is considered to comprise a line-of-sight path and a single specular reflection trailing at a delay equal to an integer number of chip durations T_c.[1] The test consists of indicating the probability of symbol error P_{se} vs. relative (to the LOS signal) strength of a specular multipath signal for various delays; the phase of the multipath is uniformly distributed relative to the LOS signal. The test presented herein sets the noise to zero. More generally, the effect of the multipath can be assessed by considering the curves of probability of symbol error P_{se} vs. E_S/N_0 for various cases of multipath delay and amplitude.

Formulation for BiOrthogonal Signaling

We consider a modulation in which the data dictates symbol-by-symbol: a) the selection of 1 of M Walsh functions chip-wise XORed with a PN code; and b) selection of the overall carrier polarity. Such a modulation was first developed by MICRILOR using 16 chips per symbol with noncoherent demodulation, and more recently by Harris using 8 chips per symbol and coherent demodulation with independent data on each carrier phase.

Noncoherent Reception

At the receiver the received symbol waveform is converted to complex baseband (I&Q) components, then these are correlated against the M possible waveforms which could have been transmitted. The magnitudes of the M complex correlator outputs are compared, and the largest is selected as the (maximum-likelihood) estimate of which waveform was actually transmitted; this conveys $\log_2 M$ bits of information. Subsequently, the current largest-magnitude complex output is compared to the previous to provide an additional bit of (DPSK) data.

Coherent Reception

At the receiver the received symbol waveform is converted to complex baseband (I&Q) components, then these are correlated against the M possible waveforms which could have been transmitted. In each baseband channel, the magnitudes of the M complex correlator outputs are compared, and the largest is selected as the (maximum-likelihood) estimate of which waveform was actually transmitted; this conveys $\log_2 M$ bits of information. The polarity of the largest-magnitude output provides an additional bit of (PSK) data.

[1] The selection of integer multiples of the chip duration corresponds to extremal values of multipath interference. For intermediate delays between these integer multiples the multipath takes on values which interpolate between the values at the integer points. This choice not only provides the bounds of performance, but it greatly simplifies computations since analog (spreading-modulation-specific) effects need not be considered. The properties at the integer delays are dependent only upon the code correlation properties.

Multipath-Induced Errors

In the absence of noise and multipath, the transmitted waveform will produce a maximum in the correct correlator output C, and zero in each of the M-1 other correlation outputs. With multipath present at delay KT_c there will be two effects: first, the K^{th} autocorrelation side lobe of the multipath will add or subtract (depending upon the relative phase of the multipath) from the main-lobe LOS signal in correlator output C; second, the Kth crosscorrelation side lobe of the multipath will cause some of the M-1 incorrect correlator outputs to be non-zero.

The above only considers the result of the current symbol waveform. In addition to this there will be a change in the correct correlator output C and also the M-1 incorrect outputs due to the multipath for the next or previous symbol.

We need only calculate the correlation properties of the sequences formed by XORing a PN code with the Walsh functions because of the stipulation that multipath delays be integer multiples of T_c. The transmitted waveform corresponds to the code $P_{Ln}W_{Jn}$, where

P_{Ln} is the sequence of the L^{th} PN code, and
W_{Jn} is the sequence for the J^{th} Walsh function.

The LOS signal produces correlator outputs

$$R_I = M \quad I = J$$
$$= 0 \quad I \neq J$$

The specular multipath for the current symbol will add a component $A_M C_{IJK}$ to the correlator channel outputs, where A_M is the relative (complex) multipath strength, and C_{IJK} is the output of the correlator for waveform J in response to waveform I for (multipath delay) shift K.

The specular multipath for the previous symbol will add a component $A_M C_{I'J(M-K)}$ to the correlator channel outputs, where $C_{I'J(M-K)}$ is the correlation matrix for the waveform of the previous symbol at shift M-K. Of course, this component must be averaged over all possible I' (the specific transmitted waveform) for each I.[2] We may estimate the contribution from $C_{I'J(M-K)}$ more simply, for near-in multipath (small K) by considering the probabilities for combinations which can occur when only a few chips of the previous waveform contribute. More generally it is necessary to consider the actual far-out correlation statistics. For example, for K=1 (the nearest resolved multipath) the contribution from the last chip of the previous symbol is ±1 with equal probability. However, the contribution must properly account for the signs of the coefficients in the correlation matrix.

An error will occur whenever the amplitude of one of the incorrect correlator outputs exceeds that of the correct correlator output. If waveform I is transmitted during the current symbol, waveform I' was transmitted during the previous symbol, and the multipath arrives at delay K relative to the LOS path, then the correlator outputs are

$$X_J = C_{IJ0} + A_M(C_{IJK} \pm C_{I'J(M-K)})$$

The ± sign is included to account for possible carrier polarity inversion between symbol waveforms. With equal probabilities there are $2M^2$ combinations of selecting the current and previous symbol waveforms with and without a carrier phase reversal; however, it is generally unnecessary to enumerate all such combinations. The M possible waveforms for the current symbol each have probability 1/M; and the probability of a phase reversal of the carrier will be 50%. However, the possible outcomes depending upon the combination of current and previous symbol

[2] We have not allowed in this notation for the PN code to be changed; it is assumed to be the same from symbol to symbol for the present discussion.

waveforms reduces to a set much smaller than M^2. For example, for K=1 (the nearest-in multipath case) only a single chip is contributed by the previous symbol, and the ± for carrier reversal includes all possibilities for the previous symbol waveform. The probability of error can be written

$$P_{SE} = \sum_k P_k \, P_{SE}\big|_k$$

where

P_k is the probability of the k^{th} combination, and
$P_{SE}\,|_k$ is the conditional probability of error for this combination.

Of course, the probabilities P_k must sum to unity. Since the phase of A_M is uniformly distributed we are at liberty to select the zero of the multipath phase to be that which maximally diminishes the autocorrelation peak in the correct correlator output.[3] Thus, we write

$$A_M = \Gamma e^{j\theta}$$

where $\Gamma<1$ is the magnitude,[4] and the phase θ can absorb the sign of the autocorrelation coefficient, if necessary. Since the demodulator selects the largest path for demodulation it is not necessary to consider $\Gamma>1$. Note that computing only cases for which the multipath is delayed relative to the path being demodulated is justified by the symmetry of the crosscorrelation statistics.

We enumerate the possible cases by specifying a set of positive numbers α_k and β_k corresponding to the magnitudes of the multipath contribution to the autocorrelation (the correct channel) and the worst-case crosscorrelation output, respectively, for that α_k. We may now evaluate the conditional probabilities of symbol error $P_{SE}|_k$.[5] An error will occur for a given α_k and β_k when the autocorrelation peak in the correct channel is diminished and an incorrect correlator output is increased to the point that an incorrect correlator output has larger magnitude than that of the correct output

$$|M - a_k \Gamma e^{j\theta}| < b_k \Gamma$$

Where all quantities except $e^{j\theta}$ are real and positive.

<u>$\alpha=0$</u>

An error occurs when $M<\beta\Gamma$ or $\Gamma>M$.

<u>$\alpha\neq0$</u>

There will be no errors for Γ below

$$\Gamma < \frac{M}{a_k + b_k}$$

[3] This means that when C_{IIK} is negative the entire row of the correlation matrix C_{IJK} should be inverted when considering combinations with the previous symbol.

[4] Since the demodulator selects the largest path for demodulation it is not necessary to consider $\Gamma>1$. Note that limiting the multipath to delay relative to the path being demodulated is a symmetry issue.

[5] Note that this is valid only for the noise-free case, for which only the largest crosscorrelation side lobe β_{Ik} determines whether an error occurs for each α_{Ik}. When noise is added, then the conditional probabilities must sum over probabilities for all significant crosscorrelation side lobes.

Once Γ exceeds the threshold value there will be symbol errors for θ=0 and some range of θ about this value. The fraction of 2π over which the value of θ gives an error is the probability of symbol error, which we now compute. We proceed by squaring

$$M^2 - 2a_k \Gamma M \cos(q) + a_k{}^2 \Gamma^2 < b_k{}^2 \Gamma^2$$

This is satisfied, if at all, for values of θ for which

$$\cos(q) > \frac{M^2 + (a_k{}^2 - b_k{}^2)\Gamma^2}{2a_k \Gamma M}$$

The boundaries θ_B of the θ region for which the inequality are given by

$$\cos(q_B) = \pm \frac{M^2 + (a_k{}^2 - b_k{}^2)\Gamma^2}{2a_k \Gamma M}$$

Thus, the conditional probability of symbol error is

$$P_{SE}\big|_k = \frac{2q_B}{2p} = \cos^{-1}\left(\frac{M^2 + (a_k{}^2 - b_k{}^2)\Gamma^2}{2a_k \Gamma M}\right)$$

α>β

Above a second threshold

$$\Gamma < \frac{M}{a_k + b_k}$$

the conditional probability of error returns to zero because the multipath contribution to the correct channel becomes larger than any of the other channels.

α=β

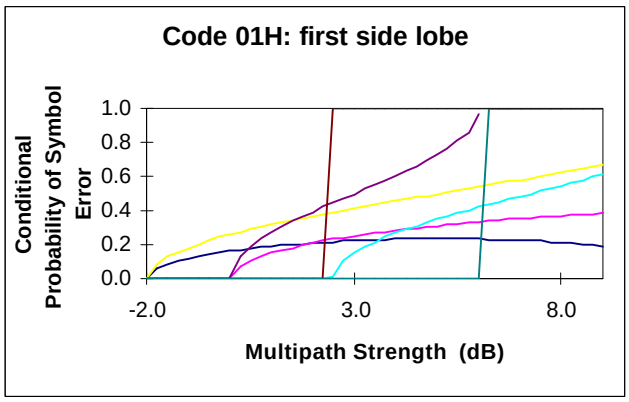
The conditional probability of error monotonically increases to the assymptote of ½.

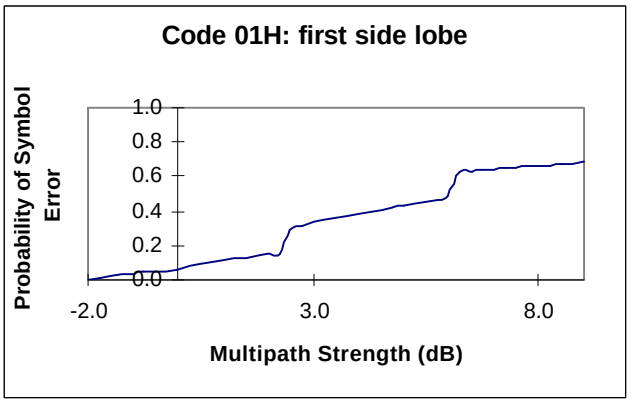
α<β

Above a second threshold

$$\Gamma < \frac{M}{a_k + b_k}$$

the conditional probability of error is fixed at 1. In general we must construct the set of α_k, β_k and P_k for a selected code.





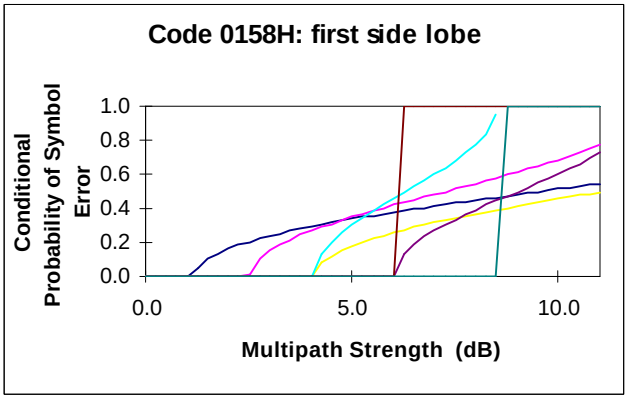
First-Side-Lobe (K=1) Performance

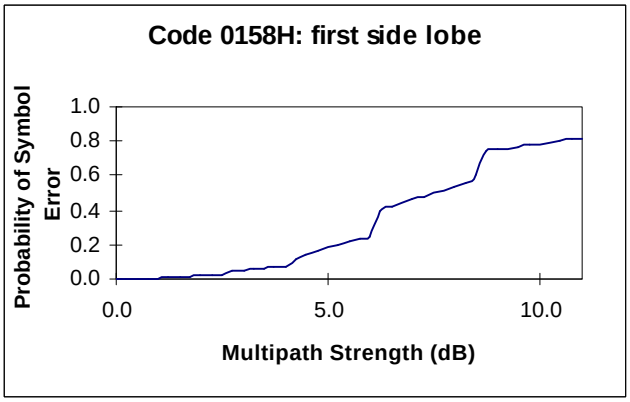
We now consider the performance of representative 8- and 16-bit codes for a specular multipath at delay T_c using noncoherent 8-ary and 16-ary signaling. Correlation details are presented in the appendices for all possible 8-bit codes and for the best 8 cosets of 16-bit codes. For each code (coset leader) a crosscorrelation matrix is presented for each integer delay. These matrices can be interpretted as correlator output along a row (i.e., which Walsh function is XORed with the PN code for a given correlator output), and transmitted waveform along a column (i.e., which Walsh function is XORed with the PN code before transmission).

In considering the effect of multipath the phase of the multipath is referenced to that which would cause a decrease in the amplitude of the correct correlation output. Because of this, the sign of the autocorrelation coefficient can be changed to be positive as long as all other coefficients in a row are also changed. This is important in considering the contribution due to the previous symbol, which for K=1 can be ±1, but which must be consistent in its effect on the main-lobe correlation as well as in the incorrect channels.

8-bit code 01_H			16-bit code 0158_H		
α_k	β_k	P_k	α_k	β_k	P_k
6	4	1/8	6	8	1/8
4	4	1/8	4	8	1/16
4	6	1/8	4	6	3/16
2	6	1/8	2	8	1/4
2	4	¼	2	6	1/8
0	6	1/8	0	8	1/16
0	4	1/8	0	6	3/16

Note that for both codes there are only 7 distinct combinations of α and β possible. We compute the conditional and overall probabilities of symbol error.





There are two important facts which can be determined by these graphs. First, there is 3 dB more tolerance of a specular multipath with 16 chips than with 8. Second, for acceptable (small) values of error probability we can approximate the noise-less case with the contribution from whichever combinations of α_k and β_k are responsible for the onset of errors, i.e., the largest $\alpha_k+\beta_k$.

It is important to realize that this is purely an effect of the correlation characteristics of the spreading codes because we have set the noise to zero. While this test is used to gain understanding, rather than as a means for predicting actual channel performance, it often occurs that the channel impulse response comprises a small set of specular components well above a background of weaker Rayleigh multipath components. In this case, the behavior of the system can be estimated by considering the ralationship between the two strongest paths.

We have postulated a receiver which selects, during acquisition, the largest multipath component for demodulation. In the case of 16-bit codes, the origninally weaker of two paths A can increase in amplitude up to the point where it becomes equal in strength to the originally stronger B and the system will continue to operate. As path A continues to increase in strength, the receiver simply switches to demodulating path A.

In the case of 8-bit codes, the origninally weaker of two paths A can increase in amplitude up to the point where it is 2-dB less in strength than the originally stronger B, at which point the system will fail to operate. As path A continues to increase in strength past that of path B, the receiver switches to demodulating path A, but cannot operate properly until path A is 2-dB stronger than path B. From this we see that, in the noise-free case, the system using 8-bit codes has a 4-dB gap in operation as two dominant paths fluctuate.

Appendix A: Correlation Matrices for All 8-Bit Codes

Code=00_H

```
          0                 1                 2                 3
+8 0 0 0 0 0 0 0 +7+1+1-1+1-1-1+1 +6+2+2-2 0 0 0 0 +5+3+1-1+1-1+1-1
 0+8 0 0 0 0 0 0 0 -1+5+1+3+1+3-1-3 -2+2+2+6 0 0 0 0 -3-1+1+3+1+3+1+3
 0 0+8 0 0 0 0 0 0 -1+1+1-1+1-1+7+1 -2+2-6-2 0 0 0 0 -1+1-1+1-1+1-5-3
 0 0 0+8 0 0 0 0 0 -1-3+1+3+1+3-1+5 -2-6+2-2 0 0 0 0 -1-3-1-3-1-3+3+1
 0 0 0 0+8 0 0 0 0 -1+1+1-1-7-1-1+1  0 0 0 0+6+2+2-2 -1+1-1+1-5-3-1+1
 0 0 0 0 0+8 0 0 0 -1-3+1+3+1-5-1-3  0 0 0 0-2+2+2+6 -1-3-1-3+3+1-1-3
 0 0 0 0 0 0+8 0 0 -1+1-7-1+1-1-1+1  0 0 0 0-2+2-6-2 +1-1+5+3+1-1+1-1
 0 0 0 0 0 0 0+8 0 -1-3+1-5+1+3-1-3  0 0 0 0-2-6+2-2 +1+3-3-1+1+3+1+3

          4                 5                 6                 7
+4+4 0 0 0 0 0 0 0 +3+3+1+1+1+1-1-1 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
-4-4 0 0 0 0 0 0 0 -3-3-1-1-1-1+1+1 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
 0 0+4+4 0 0 0 0 0 -1-1+1+1+1+1+3+3 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
 0 0-4-4 0 0 0 0 0 +1+1-1-1-1-1-3-3 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
 0 0 0 0+4+4 0 0 0 -1-1+1+1-3-3-1-1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
 0 0 0 0-4-4 0 0 0 +1+1-1-1+3+3+1+1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
 0 0 0 0 0 0+4+4 0 -1-1-3-3+1+1-1-1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
 0 0 0 0 0 0-4-4 0 +1+1+3+3-1-1+1+1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
```

code=01_H

```
          0                 1                 2                 3
+8 0 0 0 0 0 0 0 +5+3+3-3-1+1+1-1 +4+4 0 0+2-2+2-2 +3+5-1+1-1+1-1+1
 0+8 0 0 0 0 0 0 0 +1+3-1+5+3+1-3-1  0 0+4+4-2+2-2+2 -1-3+3+1+3+1+3+1
 0 0+8 0 0 0 0 0 0 +1-1-1+1+3-3+5+3  0 0-4-4-2+2-2+2 +1-1+1-1+1-1-3-5
 0 0 0+8 0 0 0 0 0 -3-1+3+1-1+5+1+3 -4-4 0 0+2-2+2-2 -3-1-3-1-3-1+1+3
 0 0 0 0+8 0 0 0 0 +1-1-1+1-5-3-3+3 +2-2+2-2+4+4 0 0 +1-1+1-1-3-5+1-1
 0 0 0 0 0+8 0 0 0 -3-1+3+1-1-3+1-5 -2+2-2+2 0 0+4+4 -3-1-3-1+1+3-3-1
 0 0 0 0 0 0+8 0 0 -3+3-5-3-1+1+1-1 -2+2-2+2 0 0-4-4 -1+1+3+5-1+1-1+1
 0 0 0 0 0 0 0+8 0 +1-5-1-3+3+1-3-1 +2-2+2-2-4-4 0 0 +3+1-1-3+3+1+3+1

          4                 5                 6                 7
+2+2+2+2+2+2-2-2 +1+1+3+3-1-1+1+1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
-2-2-2-2-2-2+2+2 -1-1-3-3+1+1-1-1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
+2+2+2+2-2-2+2+2 +1+1-1-1+3+3+1+1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
-2-2-2-2+2+2-2-2 -1-1+1+1-3-3-1-1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
+2+2-2-2+2+2+2+2 +1+1-1-1-1-1-3-3 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
-2-2+2+2-2-2-2-2 -1-1+1+1+1+1+3+3 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
-2-2+2+2+2+2+2+2 -3-3-1-1-1-1+1+1 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
+2+2-2-2-2-2-2-2 +3+3+1+1+1+1-1-1 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
```

code=02$_H$

```
         0               1               2               3
+8 0 0 0 0 0 0 0 +3+5+1-1+1-1+3-3 +4+4 0 0-2+2-2+2 +3+1+3+1+3+1-1-3
 0+8 0 0 0 0 0 0 +3+1+1+3+1+3-5+1  0 0+4+4+2-2+2-2 -1+1-1+1-1+1+3+5
 0 0+8 0 0 0 0 0 +3-3+1-1+1-1+3+5  0 0-4-4+2-2+2-2 +1+3-3-1-3-1-3-1
 0 0 0+8 0 0 0 0 -5+1+1+3+1+3+3+1 -4-4 0 0-2+2-2+2 -3-5+1-1+1-1+1-1
 0 0 0 0+8 0 0 0 -1+1-3+3-3-5-1+1 -2+2-2+2+4+4 0 0 -3-1+1+3-3-1-3-1
 0 0 0 0 0+8 0 0 -1-3+5-1-3-1-1-3 +2-2+2-2 0 0+4+4 +1-1-3-5+1-1+1-1
 0 0 0 0 0 0+8 0 -1+1-3-5-3+3-1+1 +2-2+2-2 0 0-4-4 +3+1+3+1-1-3+3+1
 0 0 0 0 0 0 0+8 -1-3-3-1+5-1-1-3 -2+2-2+2-4-4 0 0 -1+1-1+1+3+5-1+1

         4               5               6               7
+2+2+2+2-2-2+2+2 +1+1-1-1+3+3+1+1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
-2-2-2-2+2+2-2-2 -1-1+1+1-3-3-1-1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
+2+2+2+2+2+2-2-2 +1+1+3+3-1-1+1+1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
-2-2-2-2-2-2+2+2 -1-1-3-3+1+1-1-1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
-2-2+2+2+2+2+2+2 -3-3-1-1-1-1+1+1 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
+2+2-2-2-2-2-2-2 +3+3+1+1+1+1-1-1 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
+2+2-2-2+2+2+2+2 +1+1-1-1-1-1-3-3 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
-2-2+2+2-2-2-2-2 -1-1+1+1+1+1+3+3 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
```

code=03$_H$

```
         0               1               2               3
+8 0 0 0 0 0 0 0 +5+3-1+1+3-3+1-1 +2+6-2+2 0 0 0 0 +1+3+1+3+1+3-3-1
 0+8 0 0 0 0 0 0 +1+3+3+1-1+5-3-1 +2-2+6+2 0 0 0 0 +1-1+1-1+1-1+5+3
 0 0+8 0 0 0 0 0 +1-1+3-3-1+1+5+3 +2-2-2-6 0 0 0 0 +3+1-1-3-1-3-1-3
 0 0 0+8 0 0 0 0 -3-1-1+5+3+1+1+3 -6-2-2+2 0 0 0 0 -5-3-1+1-1+1-1+1
 0 0 0 0+8 0 0 0 -3+3-1+1-5-3+1-1  0 0 0 0+2+6-2+2 -1-3+3+1-1-3-1-3
 0 0 0 0 0+8 0 0 +1-5+3+1-1-3-3-1  0 0 0 0+2-2+6+2 -1+1-5-3-1+1-1+1
 0 0 0 0 0 0+8 0 +1-1-5-3-1+1-3+3  0 0 0 0+2-2-2-6 +1+3+1+3-3-1+1+3
 0 0 0 0 0 0 0+8 -3-1-1-3+3+1+1-5  0 0 0 0-6-2-2+2 +1-1+1-1+5+3+1-1

         4               5               6               7
 0 0+4+4 0 0 0 0 -1-1+1+1+1+1+3+3 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
 0 0-4-4 0 0 0 0 +1+1-1-1-1-1-3-3 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
+4+4 0 0 0 0 0 0 +3+3+1+1+1+1-1-1 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
-4-4 0 0 0 0 0 0 -3-3-1-1-1-1+1+1 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
 0 0 0 0 0 0+4+4 -1-1-3-3+1+1-1-1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
 0 0 0 0 0 0-4-4 +1+1+3+3-1-1+1+1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
 0 0 0 0+4+4 0 0 -1-1+1+1-3-3-1-1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
 0 0 0 0-4-4 0 0 +1+1-1-1+3+3+1+1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
```

Code=04$_H$

```
         0                1                2                3
+8 0 0 0 0 0 0 0 +3+5-3+3+1-1-1+1 +2+2+2+2+4 0 0-4 +3+1+3+1-1-3+3+1
 0+8 0 0 0 0 0 0 +3+1+5-1+1+3-1-3 +2+2+2+2-4 0 0+4 -1+1-1+1+3+5-1+1
 0 0+8 0 0 0 0 0 -1+1+1-1-3+3+3+5 -2-2-2-2 0+4-4 0 -3-1+1+3-3-1-3-1
 0 0 0+8 0 0 0 0 -1-3+1+3+5-1+3+1 -2-2-2-2 0-4+4 0 +1-1-3-5+1-1+1-1
 0 0 0 0+8 0 0 0 -1+1+1-1-3-5+3-3 +4 0 0-4+2+2+2+2 +1+3-3-1-3-1-3-1
 0 0 0 0 0+8 0 0 -1-3+1+3-3-1-5+1 -4 0 0+4+2+2+2+2 -3-5+1-1+1-1+1-1
 0 0 0 0 0 0+8 0 +3-3-3-5+1-1-1+1  0+4-4 0-2-2-2-2 +3+1+3+1+3+1-1-3
 0 0 0 0 0 0 0+8 -5+1-3-1+1+3-1-3  0-4+4 0-2-2-2-2 -1+1-1+1-1+1+3+5

         4                5                6                7
+2+2-2-2+2+2+2+2 +1+1-1-1-1-1-3-3 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
-2-2+2+2-2-2-2-2 -1-1+1+1+1+1+3+3 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
-2-2+2+2+2+2+2+2 -3-3-1-1-1-1+1+1 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
+2+2-2-2-2-2-2-2 +3+3+1+1+1+1-1-1 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
+2+2+2+2+2+2-2-2 +1+1+3+3-1-1+1+1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
-2-2-2-2-2-2+2+2 -1-1-3-3+1+1-1-1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
+2+2+2+2-2-2+2+2 +1+1-1-1+3+3+1+1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
-2-2-2-2+2+2-2-2 -1-1+1+1-3-3-1-1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
```

code=05$_H$

```
         0                1                2                3
+8 0 0 0 0 0 0 0 +1+7-1+1-1+1+1-1 +4 0+4 0+2+2-2-2 +1+3+1+3-3-1+1+3
 0+8 0 0 0 0 0 0 +5-1+3+1+3+1-3-1  0+4 0+4-2-2+2+2 +1-1+1-1+5+3+1-1
 0 0+8 0 0 0 0 0 +1-1-1+1-1+1+1+7 -4 0-4 0+2+2-2-2 -1-3+3+1-1-3-1-3
 0 0 0+8 0 0 0 0 -3-1+3+1+3+1+5-1  0-4 0-4-2-2+2+2 -1+1-5-3-1+1-1+1
 0 0 0 0+8 0 0 0 +1-1-1+1-1-7+1-1 +2+2-2-2+4 0+4 0 +3+1-1-3-1-3-1-3
 0 0 0 0 0+8 0 0 -3-1+3+1-5+1-3-1 -2-2+2+2 0+4 0+4 -5-3-1+1-1+1-1+1
 0 0 0 0 0 0+8 0 +1-1-1-7-1+1+1-1 +2+2-2-2-4 0-4 0 +1+3+1+3+1+3-3-1
 0 0 0 0 0 0 0+8 -3-1-5+1+3+1-3-1 -2-2+2+2 0-4 0-4 +1-1+1-1+1-1+5+3

         4                5                6                7
 0 0 0 0+4+4 0 0 -1-1+1+1-3-3-1-1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
 0 0 0 0-4-4 0 0 +1+1-1-1+3+3+1+1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
 0 0 0 0 0 0+4+4 -1-1-3-3+1+1-1-1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
 0 0 0 0 0 0-4-4 +1+1+3+3-1-1+1+1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
+4+4 0 0 0 0 0 0 +3+3+1+1+1+1-1-1 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
-4-4 0 0 0 0 0 0 -3-3-1-1-1-1+1+1 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
 0 0+4+4 0 0 0 0 -1-1+1+1+1+1+3+3 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
 0 0-4-4 0 0 0 0 +1+1-1-1-1-1-3-3 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
```

code=06$_H$

```
         0               1               2               3
+8 0 0 0 0 0 0 0 +3+5+1-1-3+3-1+1  0+4 0+4+2+2-2-2 +1-1+5+3+1-1+1-1
 0+8 0 0 0 0 0 0 +3+1+1+3+5-1-1-3 +4 0+4 0-2-2+2+2 +1+3-3-1+1+3+1+3
 0 0+8 0 0 0 0 0 -1+1-3+3+1-1+3+5  0-4 0-4+2+2-2-2 -1+1-1+1-5-3-1+1
 0 0 0+8 0 0 0 0 -1-3+5-1+1+3+3+1 -4 0-4 0-2-2+2+2 -1-3-1-3+3+1-1-3
 0 0 0 0+8 0 0 0 +3-3+1-1-3-5-1+1 +2+2-2-2 0+4 0+4 -1+1-1+1-1+1-5-3
 0 0 0 0 0+8 0 0 -5+1+1+3-3-1-1-3 -2-2+2+2+4 0+4 0 -1-3-1-3-1-3+3+1
 0 0 0 0 0 0+8 0 -1+1-3-5+1-1+3-3 +2+2-2-2 0-4 0-4 +5+3+1-1+1-1+1-1
 0 0 0 0 0 0 0+8 -1-3-3-1+1+3-5+1 -2-2+2+2-4 0-4 0 -3-1+1+3+1+3+1+3

         4               5               6               7
 0 0 0 0 0 0+4+4 -1-1-3-3+1+1-1-1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
 0 0 0 0 0 0-4-4 +1+1+3+3-1-1+1+1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
 0 0 0 0+4+4 0 0 -1-1+1+1-3-3-1-1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
 0 0 0 0-4-4 0 0 +1+1-1-1+3+3+1+1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
 0 0+4+4 0 0 0 0 -1-1+1+1+1+1+3+3 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
 0 0-4-4 0 0 0 0 +1+1-1-1-1-1-3-3 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
+4+4 0 0 0 0 0 0 +3+3+1+1+1+1-1-1 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
-4-4 0 0 0 0 0 0 -3-3-1-1-1-1+1+1 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
```

code=07$_H$

```
         0               1               2               3
+8 0 0 0 0 0 0 0 +5+3-1+1-1+1-3+3 +2+2+2+2 0+4-4 0 -1+1+3+5-1+1-1+1
 0+8 0 0 0 0 0 0 +1+3+3+1+3+1+1-5 +2+2+2+2 0-4+4 0 +3+1-1-3+3+1+3+1
 0 0+8 0 0 0 0 0 -3+3-1+1-1+1+5+3 -2-2-2-2+4 0 0-4 +1-1+1-1-3-5+1-1
 0 0 0+8 0 0 0 0 +1-5+3+1+3+1+1+3 -2-2-2-2-4 0 0+4 -3-1-3-1+1+3-3-1
 0 0 0 0+8 0 0 0 +1-1+3-3-5-3+1-1  0+4-4 0+2+2+2+2 +1-1+1-1+1-1-3-5
 0 0 0 0 0+8 0 0 -3-1-1+5-1-3-3-1  0-4+4 0+2+2+2+2 -3-1-3-1-3-1+1+3
 0 0 0 0 0 0+8 0 +1-1-5-3+3-3+1-1 +4 0 0-4-2-2-2-2 +3+5-1+1-1+1-1+1
 0 0 0 0 0 0 0+8 -3-1-1-3-1+5-3-1 -4 0 0+4-2-2-2-2 -1-3+3+1+3+1+3+1

         4               5               6               7
-2-2+2+2+2+2+2+2 -3-3-1-1-1-1+1+1 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
+2+2-2-2-2-2-2-2 +3+3+1+1+1+1-1-1 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
+2+2-2-2+2+2+2+2 +1+1-1-1-1-1-3-3 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
-2-2+2+2-2-2-2-2 -1-1+1+1+1+1+3+3 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
+2+2+2+2-2-2+2+2 +1+1-1-1+3+3+1+1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
-2-2-2-2+2+2-2-2 -1-1+1+1-3-3-1-1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
+2+2+2+2+2+2-2-2 +1+1+3+3-1-1+1+1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
-2-2-2-2-2-2+2+2 -1-1-3-3+1+1-1-1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
```

code=10_H

0	1	2	3
+8 0 0 0 0 0 0 0	+3-3+5+3+1-1-1+1	+2-2+2-2+4+4 0 0	+1-1+1-1+1-1-3-5
0+8 0 0 0 0 0 0 0	-1+5+1+3-3-1+3+1	-2+2-2+2 0 0+4+4	-3-1-3-1-3-1+1+3
0 0+8 0 0 0 0 0 0	-1+1+1-1+5+3+3-3	-2+2-2+2 0 0-4-4	+3+5-1+1-1+1-1+1
0 0 0+8 0 0 0 0 0	+3+1-3-1+1+3-1+5	+2-2+2-2-4-4 0 0	-1-3+3+1+3+1+3+1
0 0 0 0+8 0 0 0 0	-1+1+1-1-3+3-5-3	+4+4 0 0+2-2+2-2	-1+1+3+5-1+1-1+1
0 0 0 0 0+8 0 0 0	+3+1-3-1+1-5-1-3	0 0+4+4-2+2-2+2	+3+1-1-3+3+1+3+1
0 0 0 0 0 0+8 0 0	-5-3-3+3+1-1-1+1	0 0-4-4-2+2-2+2	+1-1+1-1-3-5+1-1
0 0 0 0 0 0 0+8	-1-3+1-5-3-1+3+1	-4-4 0 0+2-2+2-2	-3-1-3-1+1+3-3-1

4	5	6	7
+2+2+2+2+2+2-2-2	+3+3+1+1+1+1-1-1	+2+2+2+2 0 0 0 0	+1+1+1+1+1+1+1+1
-2-2-2-2-2-2+2+2	-3-3-1-1-1-1+1+1	-2-2-2-2 0 0 0 0	-1-1-1-1-1-1-1-1
+2+2+2+2-2-2+2+2	-1-1+1+1+1+1+3+3	-2-2-2-2 0 0 0 0	-1-1-1-1-1-1-1-1
-2-2-2-2+2+2-2-2	+1+1-1-1-1-1-3-3	+2+2+2+2 0 0 0 0	+1+1+1+1+1+1+1+1
+2+2-2-2+2+2+2+2	-1-1+1+1-3-3-1-1	0 0 0 0+2+2+2+2	-1-1-1-1-1-1-1-1
-2-2+2+2-2-2-2-2	+1+1-1-1+3+3+1+1	0 0 0 0-2-2-2-2	+1+1+1+1+1+1+1+1
-2-2+2+2+2+2+2+2	-1-1-3-3+1+1-1-1	0 0 0 0-2-2-2-2	+1+1+1+1+1+1+1+1
+2+2-2-2-2-2-2-2	+1+1+3+3-1-1+1+1	0 0 0 0+2+2+2+2	-1-1-1-1-1-1-1-1

code=11_H

0	1	2	3
+8 0 0 0 0 0 0 0	+1-1+7+1-1+1+1-1	0 0 0 0+6+2+2-2	-1+1-1+1-1+1-5-3
0+8 0 0 0 0 0 0 0	+1+3-1+5-1-3+1+3	0 0 0 0-2+2+2+6	-1-3-1-3-1-3+3+1
0 0+8 0 0 0 0 0 0	+1-1-1+1+7+1+1-1	0 0 0 0-2+2-6-2	+5+3+1-1+1-1+1-1
0 0 0+8 0 0 0 0 0	+1+3-1-3-1+5+1+3	0 0 0 0-2-6+2-2	-3-1+1+3+1+3+1+3
0 0 0 0+8 0 0 0 0	+1-1-1+1-1+1-7-1	+6+2+2-2 0 0 0 0	+1-1+5+3+1-1+1-1
0 0 0 0 0+8 0 0 0	+1+3-1-3-1-3+1-5	-2+2+2+6 0 0 0 0	+1+3-3-1+1+3+1+3
0 0 0 0 0 0+8 0 0	-7-1-1+1-1+1+1-1	-2+2-6-2 0 0 0 0	-1+1-1+1-5-3-1+1
0 0 0 0 0 0 0+8 0	+1-5-1-3-1-3+1+3	-2-6+2-2 0 0 0 0	-1-3-1-3+3+1-1-3

4	5	6	7
+4+4 0 0 0 0 0 0 0	+1+1+3+3-1-1+1+1	0 0 0 0+2+2+2+2	-1-1-1-1-1-1-1-1
-4-4 0 0 0 0 0 0 0	-1-1-3-3+1+1-1-1	0 0 0 0-2-2-2-2	+1+1+1+1+1+1+1+1
0 0+4+4 0 0 0 0 0	+1+1-1-1+3+3+1+1	0 0 0 0-2-2-2-2	+1+1+1+1+1+1+1+1
0 0-4-4 0 0 0 0 0	-1-1+1+1-3-3-1-1	0 0 0 0+2+2+2+2	-1-1-1-1-1-1-1-1
0 0 0 0+4+4 0 0 0	+1+1-1-1-1-1-3-3	+2+2+2+2 0 0 0 0	+1+1+1+1+1+1+1+1
0 0 0 0-4-4 0 0 0	-1-1+1+1+1+1+3+3	-2-2-2-2 0 0 0 0	-1-1-1-1-1-1-1-1
0 0 0 0 0 0+4+4 0	-3-3-1-1-1-1+1+1	-2-2-2-2 0 0 0 0	-1-1-1-1-1-1-1-1
0 0 0 0 0 0-4-4 0	+3+3+1+1+1+1-1-1	+2+2+2+2 0 0 0 0	+1+1+1+1+1+1+1+1

code=12$_H$

0	1	2	3
+8 0 0 0 0 0 0 0	-1+1+5+3+1-1+3-3	0 0 0 0+2+6-2+2	+3+1-1-3-1-3-1-3
0+8 0 0 0 0 0 0 0	+3+1+1+3-3-1-1+5	0 0 0 0+2-2+6+2	-5-3-1+1-1+1-1+1
0 0+8 0 0 0 0 0 0	+3-3+1-1+5+3-1+1	0 0 0 0+2-2-2-6	+1+3+1+3+1+3-3-1
0 0 0+8 0 0 0 0 0	-1+5-3-1+1+3+3+1	0 0 0 0-6-2-2+2	+1-1+1-1+1-1+5+3
0 0 0 0+8 0 0 0 0	-1+1-3+3+1-1-5-3	+2+6-2+2 0 0 0 0	+1+3+1+3-3-1+1+3
0 0 0 0 0+8 0 0 0	+3+1+1-5-3-1-1-3	+2-2+6+2 0 0 0 0	+1-1+1-1+5+3+1-1
0 0 0 0 0 0+8 0 0	-5-3+1-1-3+3-1+1	+2-2-2-6 0 0 0 0	-1-3+3+1-1-3-1-3
0 0 0 0 0 0 0+8 0	-1-3-3-1+1-5+3+1	-6-2-2+2 0 0 0 0	-1+1-5-3-1+1-1+1

4	5	6	7
0 0+4+4 0 0 0 0	+1+1-1-1+3+3+1+1	0 0 0 0-2-2-2-2	+1+1+1+1+1+1+1+1
0 0-4-4 0 0 0 0	-1-1+1+1-3-3-1-1	0 0 0 0+2+2+2+2	-1-1-1-1-1-1-1-1
+4+4 0 0 0 0 0 0	+1+1+3+3-1-1+1+1	0 0 0 0+2+2+2+2	-1-1-1-1-1-1-1-1
-4-4 0 0 0 0 0 0	-1-1-3-3+1+1-1-1	0 0 0 0-2-2-2-2	+1+1+1+1+1+1+1+1
0 0 0 0 0 0+4+4	-3-3-1-1-1-1+1+1	-2-2-2-2 0 0 0 0	-1-1-1-1-1-1-1-1
0 0 0 0 0 0-4-4	+3+3+1+1+1+1-1-1	+2+2+2+2 0 0 0 0	+1+1+1+1+1+1+1+1
0 0 0 0+4+4 0 0	+1+1-1-1-1-1-3-3	+2+2+2+2 0 0 0 0	+1+1+1+1+1+1+1+1
0 0 0 0-4-4 0 0	-1-1+1+1+1+1+3+3	-2-2-2-2 0 0 0 0	-1-1-1-1-1-1-1-1

Code=13$_H$

0	1	2	3
+8 0 0 0 0 0 0 0	+1-1+3+5+3-3+1-1	-2+2-2+2+4+4 0 0	+1+3-3-1-3-1-3-1
0+8 0 0 0 0 0 0 0	+1+3+3+1-5+1+1+3	+2-2+2-2 0 0+4+4	-3-5+1-1+1-1+1-1
0 0+8 0 0 0 0 0 0	+1-1+3-3+3+5+1-1	+2-2+2-2 0 0-4-4	+3+1+3+1+3+1-1-3
0 0 0+8 0 0 0 0 0	+1+3-5+1+3+1+1+3	-2+2-2+2-4-4 0 0	-1+1-1+1-1+1+3+5
0 0 0 0+8 0 0 0 0	-3+3-1+1-1+1-3-5	+4+4 0 0-2+2-2+2	+3+1+3+1-1-3+3+1
0 0 0 0 0+8 0 0 0	+5-1-1-3-1-3-3-1	0 0+4+4+2-2+2-2	-1+1-1+1+3+5-1+1
0 0 0 0 0 0+8 0 0	-3-5-1+1-1+1-3+3	0 0-4-4+2-2+2-2	-3-1+1+3-3-1-3-1
0 0 0 0 0 0 0+8	-3-1-1-3-1-3+5-1	-4-4 0 0-2+2-2+2	+1-1-3-5+1-1+1-1

4	5	6	7
+2+2+2+2-2-2+2+2	-1-1+1+1+1+1+3+3	-2-2-2-2 0 0 0 0	-1-1-1-1-1-1-1-1
-2-2-2-2+2+2-2-2	+1+1-1-1-1-1-3-3	+2+2+2+2 0 0 0 0	+1+1+1+1+1+1+1+1
+2+2+2+2+2+2-2-2	+3+3+1+1+1+1-1-1	+2+2+2+2 0 0 0 0	+1+1+1+1+1+1+1+1
-2-2-2-2-2-2+2+2	-3-3-1-1-1-1+1+1	-2-2-2-2 0 0 0 0	-1-1-1-1-1-1-1-1
-2-2+2+2+2+2+2+2	-1-1-3-3+1+1-1-1	0 0 0 0-2-2-2-2	+1+1+1+1+1+1+1+1
+2+2-2-2-2-2-2-2	+1+1+3+3-1-1+1+1	0 0 0 0+2+2+2+2	-1-1-1-1-1-1-1-1
+2+2-2-2+2+2+2+2	-1-1+1+1-3-3-1-1	0 0 0 0+2+2+2+2	-1-1-1-1-1-1-1-1
-2-2+2+2-2-2-2-2	+1+1-1-1+3+3+1+1	0 0 0 0-2-2-2-2	+1+1+1+1+1+1+1+1

code=14$_H$

0	1	2	3
+8 0 0 0 0 0 0 0	-1+1+1+7+1-1-1+1	+2+2-2-2+4 0+4 0	-1-3+3+1-1-3-1-3
0+8 0 0 0 0 0 0 0	+3+1+5-1-3-1+3+1	-2-2+2+2 0+4 0+4	-1+1-5-3-1+1-1+1
0 0+8 0 0 0 0 0 0	-1+1+1-1+1+7-1+1	+2+2-2-2-4 0-4 0	+1+3+1+3-3-1+1+3
0 0 0+8 0 0 0 0 0	+3+1-3-1+5-1+3+1	-2-2+2+2 0-4 0-4	+1-1+1-1+5+3+1-1
0 0 0 0+8 0 0 0 0	-1+1+1-1+1-1-1-7	+4 0+4 0+2+2-2-2	+1+3+1+3+1+3-3-1
0 0 0 0 0+8 0 0 0	+3+1-3-1-3-1-5+1	0+4 0+4-2-2+2+2	+1-1+1-1+1-1+5+3
0 0 0 0 0 0+8 0 0	-1-7+1-1+1-1-1+1	-4 0-4 0+2+2-2-2	+3+1-1-3-1-3-1-3
0 0 0 0 0 0 0+8 0	-5+1-3-1-3-1+3+1	0-4 0-4-2-2+2+2	-5-3-1+1-1+1-1+1

4	5	6	7
0 0 0 0+4+4 0 0	+1+1-1-1-1-1-3-3	+2+2+2+2 0 0 0 0	+1+1+1+1+1+1+1+1
0 0 0 0-4-4 0 0	-1-1+1+1+1+1+3+3	-2-2-2-2 0 0 0 0	-1-1-1-1-1-1-1-1
0 0 0 0 0 0+4+4	-3-3-1-1-1-1+1+1	-2-2-2-2 0 0 0 0	-1-1-1-1-1-1-1-1
0 0 0 0 0 0-4-4	+3+3+1+1+1+1-1-1	+2+2+2+2 0 0 0 0	+1+1+1+1+1+1+1+1
+4+4 0 0 0 0 0 0	+1+1+3+3-1-1+1+1	0 0 0 0+2+2+2+2	-1-1-1-1-1-1-1-1
-4-4 0 0 0 0 0 0	-1-1-3-3+1+1-1-1	0 0 0 0-2-2-2-2	+1+1+1+1+1+1+1+1
0 0+4+4 0 0 0 0	+1+1-1-1+3+3+1+1	0 0 0 0-2-2-2-2	+1+1+1+1+1+1+1+1
0 0-4-4 0 0 0 0	-1-1+1+1-3-3-1-1	0 0 0 0+2+2+2+2	-1-1-1-1-1-1-1-1

code=15$_H$

0	1	2	3
+8 0 0 0 0 0 0 0	-3+3+3+5-1+1+1-1	+4 0 0-4+2+2+2+2	-3-1+1+3-3-1-3-1
0+8 0 0 0 0 0 0 0	+5-1+3+1-1-3+1+3	-4 0 0+4+2+2+2+2	+1-1-3-5+1-1+1-1
0 0+8 0 0 0 0 0 0	+1-1-1+1+3+5-3+3	0+4-4 0-2-2-2-2	+3+1+3+1-1-3+3+1
0 0 0+8 0 0 0 0 0	+1+3-1-3+3+1+5-1	0-4+4 0-2-2-2-2	-1+1-1+1+3+5-1+1
0 0 0 0+8 0 0 0 0	+1-1-1+1+3-3-3-5	+2+2+2+2+4 0 0-4	+3+1+3+1+3+1-1-3
0 0 0 0 0+8 0 0 0	+1+3-1-3-5+1-3-1	+2+2+2+2-4 0 0+4	-1+1-1+1-1+1+3+5
0 0 0 0 0 0+8 0 0	-3-5+3-3-1+1+1-1	-2-2-2-2 0+4-4 0	+1+3-3-1-3-1-3-1
0 0 0 0 0 0 0+8 0	-3-1-5+1-1-3+1+3	-2-2-2-2 0-4+4 0	-3-5+1-1+1-1+1-1

4	5	6	7
+2+2-2-2+2+2+2+2	-1-1+1+1-3-3-1-1	0 0 0 0+2+2+2+2	-1-1-1-1-1-1-1-1
-2-2+2+2-2-2-2-2	+1+1-1-1+3+3+1+1	0 0 0 0-2-2-2-2	+1+1+1+1+1+1+1+1
-2-2+2+2+2+2+2+2	-1-1-3-3+1+1-1-1	0 0 0 0-2-2-2-2	+1+1+1+1+1+1+1+1
+2+2-2-2-2-2-2-2	+1+1+3+3-1-1+1+1	0 0 0 0+2+2+2+2	-1-1-1-1-1-1-1-1
+2+2+2+2+2+2-2-2	+3+3+1+1+1+1-1-1	+2+2+2+2 0 0 0 0	+1+1+1+1+1+1+1+1
-2-2-2-2-2-2+2+2	-3-3-1-1-1-1+1+1	-2-2-2-2 0 0 0 0	-1-1-1-1-1-1-1-1
+2+2+2+2-2-2+2+2	-1-1+1+1+1+1+3+3	-2-2-2-2 0 0 0 0	-1-1-1-1-1-1-1-1
-2-2-2-2+2+2-2-2	+1+1-1-1-1-1-3-3	+2+2+2+2 0 0 0 0	+1+1+1+1+1+1+1+1

code=16$_H$

```
         0                1                2                3
+8 0 0 0 0 0 0 0 -1+1+5+3-3+3-1+1  0+4-4 0+2+2+2+2 +1-1+1-1-3-5+1-1
 0+8 0 0 0 0 0 0 +3+1+1+3+1-5+3+1  0-4+4 0+2+2+2+2 -3-1-3-1+1+3-3-1
 0 0+8 0 0 0 0 0 -1+1-3+3+5+3-1+1 +4 0 0-4-2-2-2-2 -1+1+3+5-1+1-1+1
 0 0 0+8 0 0 0 0 +3+1+1-5+1+3+3+1 -4 0 0+4-2-2-2-2 +3+1-1-3+3+1+3+1
 0 0 0 0+8 0 0 0 +3-3+1-1+1-1-5-3 +2+2+2+2 0+4-4 0 +3+5-1+1-1+1-1+1
 0 0 0 0 0+8 0 0 -1+5-3-1-3-1-1-3 +2+2+2+2 0-4+4 0 -1-3+3+1+3+1+3+1
 0 0 0 0 0 0+8 0 -5-3+1-1+1-1+3-3 -2-2-2-2+4 0 0-4 +1-1+1-1+1-1-3-5
 0 0 0 0 0 0 0+8 -1-3-3-1-3-1-1+5 -2-2-2-2-4 0 0+4 -3-1-3-1-3-1+1+3

         4                5                6                7
-2-2+2+2+2+2+2+2 -1-1-3-3+1+1-1-1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
+2+2-2-2-2-2-2-2 +1+1+3+3-1-1+1+1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
+2+2-2-2+2+2+2+2 -1-1+1+1-3-3-1-1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
-2-2+2+2-2-2-2-2 +1+1-1-1+3+3+1+1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
+2+2+2+2-2-2+2+2 -1-1+1+1+1+1+3+3 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
-2-2-2-2+2+2-2-2 +1+1-1-1-1-1-3-3 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
+2+2+2+2+2+2-2-2 +3+3+1+1+1+1-1-1 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
-2-2-2-2-2-2+2+2 -3-3-1-1-1-1+1+1 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
```

code=17$_H$

```
         0                1                2                3
+8 0 0 0 0 0 0 0 +1-1+3+5-1+1-3+3 +2+2-2-2 0+4 0+4 -1+1-1+1-5-3-1+1
 0+8 0 0 0 0 0 0 +1+3+3+1-1-3+5-1 -2-2+2+2+4 0+4 0 -1-3-1-3+3+1-1-3
 0 0+8 0 0 0 0 0 -3+3-1+1+3+5+1-1 +2+2-2-2 0-4 0-4 +1-1+5+3+1-1+1-1
 0 0 0+8 0 0 0 0 +5-1-1-3+3+1+1+3 -2-2+2+2-4 0-4 0 +1+3-3-1+1+3+1+3
 0 0 0 0+8 0 0 0 +1-1+3-3-1+1-3-5  0+4 0+4+2+2-2-2 +5+3+1-1+1-1+1-1
 0 0 0 0 0+8 0 0 +1+3-5+1-1-3-3-1 +4 0+4 0-2-2+2+2 -3-1+1+3+1+3+1+3
 0 0 0 0 0 0+8 0 -3-5-1+1+3-3+1-1  0-4 0-4+2+2-2-2 -1+1-1+1-1+1-5-3
 0 0 0 0 0 0 0+8 -3-1-1-3-5+1+1+3 -4 0-4 0-2-2+2+2 -1-3-1-3-1-3+3+1

         4                5                6                7
 0 0 0 0 0 0+4+4 -3-3-1-1-1-1+1+1 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
 0 0 0 0 0 0-4-4 +3+3+1+1+1+1-1-1 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
 0 0 0 0+4+4 0 0 +1+1-1-1-1-1-3-3 +2+2+2+2 0 0 0 0 +1+1+1+1+1+1+1+1
 0 0 0 0-4-4 0 0 -1-1+1+1+1+1+3+3 -2-2-2-2 0 0 0 0 -1-1-1-1-1-1-1-1
 0 0+4+4 0 0 0 0 +1+1-1-1+3+3+1+1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
 0 0-4-4 0 0 0 0 -1-1+1+1-3-3-1-1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
+4+4 0 0 0 0 0 0 +1+1+3+3-1-1+1+1  0 0 0 0+2+2+2+2 -1-1-1-1-1-1-1-1
-4-4 0 0 0 0 0 0 -1-1-3-3+1+1-1-1  0 0 0 0-2-2-2-2 +1+1+1+1+1+1+1+1
```

Appendix B: Correlation Matrices for the 8 Best 16-Bit Codes

(X stands for +16)

Code=0158$_H$

0	1
X 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 5 1 7 1 7-5-3-3 3-1 1-1 1 5-5
0 X 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	7 5 5-1 5-1-1-3 1-5 3 1 3 1-7 3
0 0 X 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-5 5 1 7 1-1 3 5 5 3-1 1-1-7-3 3
0 0 0 X 0 0 0 0 0 0 0 0 0 0 0 0 0	7-3 5-1-3-1 7 5 1 3 3 1-5 1 1-5
0 0 0 0 X 0 0 0 0 0 0 0 0 0 0 0 0	-1 1 5-5-3 3-1 1 1 7-5-3 3 5 1 7
0 0 0 0 0 X 0 0 0 0 0 0 0 0 0 0 0	3 1-7 3 1-5 3 1 5-1-1-3 7 5 5-1
0 0 0 0 0 0 X 0 0 0 0 0 0 0 0 0 0	-1-7-3 3 5 3-1 1 1-1 3 5-5 5 1 7
0 0 0 0 0 0 0 X 0 0 0 0 0 0 0 0 0	-5 1 1-5 1 3 3 1-3-1 7 5 7-3 5-1
0 0 0 0 0 0 0 0 X 0 0 0 0 0 0 0 0	3-3 1-1 1-1-5 5-3-5-1-7-1-7 5 3
0 0 0 0 0 0 0 0 0 X 0 0 0 0 0 0 0	-1 5-3-1-3-1 7-3-7-5-5 1-5 1 1 3
0 0 0 0 0 0 0 0 0 0 X 0 0 0 0 0 0	-5-3 1-1 1 7 3-3 5-5-1-7-1 1-3-5
0 0 0 0 0 0 0 0 0 0 0 X 0 0 0 0 0	-1-3-3-1 5-1-1 5-7 3-5 1 3 1-7-5
0 0 0 0 0 0 0 0 0 0 0 0 X 0 0 0 0	-1-7 5 3-3-5-1-7 1-1-5 5 3-3 1-1
0 0 0 0 0 0 0 0 0 0 0 0 0 X 0 0 0	-5 1 1 3-7-5-5 1-3-1 7-3-1 5-3-1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 X 0 0	-1 1-3-5 5-5-1-7 1 7 3-3-5-3 1-1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X 0	3 1-7-5-7 3-5 1 5-1-1 5-1-3-3-1

2	3
6 6 2 2 2-6 6-2 0 4 0-4 0 4 0-4	1 3 7 5 1 3-1-3-3-1 3 1-7 3-1 5
2 2 6 6-2 6-6 2 4 0-4 0 4 0-4 0	5 3 3 5-3-5 3 5 1-1-1 1 5-5 3-3
6-2 2-6 2 2 6 6 0-4 0 4 0-4 0 4	-3-1-5 1 5 7-5 1 1 3-1 5 5-1 3 1
-6 2-2 6 6 6 2 2-4 0 4 0-4 0 4 0	1-1-1-7 1-1 7 1 5 3 3-3 1 7-1 1
-2 6-6 2-6-6-2-2 0-4 0 4 0-4 0 4	7-3 1-5 3 1-3-1-1-3 1 3-1-3-7-5
2-6 6-2-2-2-6-6-4 0 4 0-4 0 4 0	-5 5-3 3-1 1 1-1 3 5-3-5-5-3-3-5
-2-2-6-6-6 2-2 6 0 4 0-4 0 4 0-4	-5 1-3-1-1-3 1-5-5-7 5-1 3 1 5-1
-6-6-2-2 6-2 2-6 4 0-4 0 4 0-4 0	-1-7 1-1-5-3-3 3-1 1-7-1-1 1 1 7
0 4 0-4 0 4 0-4 6 6 2 2 2-6 6-2	3 1-3-1 7-3 1-5-1-3-7-5-1-3 1 3
4 0-4 0 4 0-4 0 2 2 6 6-2 6-6 2	-1 1 1-1-5 5-3 3-5-3-3-5 3 5-3-5
0-4 0 4 0-4 0 4 6-2 2-6 2 2 6 6	-1-3 1-5-5 1-3-1 3 1 5-1-5-7 5-1
-4 0 4 0-4 0 4 0-6 2-2 6 6 6 2 2	-5-3-3 3-1-7 1-1-1 1 1 7-1 1-7-1
0-4 0 4 0-4 0 4-2 6-6 2-6-6-2-2	1 3-1-3 1 3 7 5-7 3-1 5-3-1 3 1
-4 0 4 0-4 0 4 0 2-6 6-2-2-2-6-6	-3-5 3 5 5 3 3 5 5-5 3-3 1-1-1 1
0 4 0-4 0 4 0-4-2-2-6-6-6 2-2 6	5 7-5 1-3-1-5 1 5-1 3 1 1 3-1 5
4 0-4 0 4 0-4 0-6-6-2-2 6-2 2-6	1-1 7 1 1-1-1-7 1 7-1 1 5 3 3-3

4	5
2 6-2 2-2 2 2 6 6 2 2-2-2 2-6-2	3 1 3 1 1 3 1 3-3-9 5-1 3 1 3 1
2-2 6 2 6 2 2-2-2 2 2 6-2-6 2-2	-1 1-1 1 5 3 5 3 1 7-7-1-1 1-1 1
2-2-2-6-2-6 2-2-2 2-6-2 6 2 2-2	-3-1 1 3-1-3-5-7-5 1-1 5-3-1 1 3
-6-2-2 2-2 2-6-2-2-6 2-2-2 2 2 6	1-1-3-5-5-3-1 1 7 1 3-3 1-1-3-5
-2 2 2 6 2 6-2 2-2 2-6-2 6 2 2-2	3 1 3 1-3-9 5-1 1 3 1 3 3 1 3 1
6 2 2-2 2-2 6 2-2-6 2-2-2 2 2 6	-1 1-1 1 1 7-7-1 5 3 5 3-1 1-1 1
-2-6 2-2 2-2-2-6 6 2 2-2-2 2-6-2	-3-1 1 3-5 1-1 5-1-3-5-7-3-1 1 3
-2 2-6-2-6-2-2 2-2 2 2 6-2-6 2-2	1-1-3-5 7 1 3-3-5-3-1 1 1-1-3-5
6 2 2-2-2 2-6-2 2 6-2 2-2 2 2 6	3 9-5 1-3-1-3-1-3-1-3-1-1-3-1-3
-2 2 2 6-2-6 2-2 2-2 6 2 6 2 2-2	-1-7 7 1 1-1 1-1 1-1 1-1-5-3-5-3
-2 2-6-2 6 2 2-2 2-2-2-6-2-6 2-2	5-1 1-5 3 1-1-3 3 1-1-3 1 3 5 7
-2-6 2-2-2 2 2 6-6-2-2 2-2 2-6-2	-7-1-3 3-1 1 3 5-1 1 3 5 5 3 1-1
-2 2-6-2 6 2 2-2-2 2 2 6 2 6-2 2	-1-3-1-3-3-1-3-1-3-1-3-1 3 9-5 1
-2-6 2-2-2 2 2 6 6 2 2-2 2-2 6 2	-5-3-5-3 1-1 1-1 1-1 1-1-1-7 7 1
6 2 2-2-2 2-6-2-2-6 2-2 2-2-2-6	1 3 5 7 3 1-1-3 3 1-1-3 5-1 1-5
-2 2 2 6-2-6 2-2-2 2-6-2-6-2-2 2	5 3 1-1-1 1 3 5-1 1 3 5-7-1-3 3

6

```
-2-2 2 2 2 2-2-2 8 4 4 0 4 0 0-4
 2 2-2-2-2-2 2 2-4 0 0 4 0 4 4 8
 2 2-2-2-2-2 2 2 0 4-4 0-4 0-8-4
-2-2 2 2 2 2-2-2-4-8 0-4 0-4 4 0
-2-2 2 2 2 2-2-2-4 0 0 4-8-4-4 0
 2 2-2-2-2-2 2 2 0-4-4-8 4 0 0-4
 2 2-2-2-2-2 2 2 4 0 8 4 0-4 4 0
-2-2 2 2 2 2-2-2 0 4-4 0 4 8 0 4
 8 4 4 0 4 0 0-4-2-2 2 2 2 2-2-2
-4 0 0 4 0 4 4 8 2 2-2-2-2-2 2 2
 0 4-4 0-4 0-8-4 2 2-2-2-2-2 2 2
-4-8 0-4 0-4 4 0-2-2 2 2 2 2-2-2
-4 0 0 4-8-4-4 0-2-2 2 2 2 2-2-2
 0-4-4-8 4 0 0-4 2 2-2-2-2-2 2 2
 4 0 8 4 0-4 4 0 2 2-2-2-2-2 2 2
 0 4-4 0 4 8 0 4-2-2 2 2 2 2-2-2
```

7

```
-1-3 3 1-1-3 3 1-1-3-5-7-1-3 3 1
-1 1-5-3-1 1-5-3-1 1 3 5-1 1-5-3
 1 3 1 3 1 3 1 3-7-5 1 3 1 3 1 3
 1-1 1-1 1-1 1-1 9 7 1-1 1-1 1-1
 1 3-3-1 1 3 5 7 1 3-3-1 1 3-3-1
 1-1 5 3 1-1-3-5 1-1 5 3 1-1 5 3
-1-3-1-3 7 5-1-3-1-3-1-3-1-3-1-3
-1 1-1 1-9-7-1 1-1 1-1 1-1 1-1 1
 1 3 5 7 1 3-3-1 1 3-3-1 1 3-3-1
 1-1-3-5 1-1 5 3 1-1 5 3 1-1 5 3
 7 5-1-3-1-3-1-3-1-3-1-3-1-3-1-3
-9-7-1 1-1 1-1 1-1 1-1 1-1 1-1 1
-1-3 3 1-1-3 3 1-1-3 3 1-1-3-5-7
-1 1-5-3-1 1-5-3-1 1-5-3-1 1 3 5
 1 3 1 3 1 3 1 3 1 3 1 3-7-5 1 3
 1-1 1-1 1-1 1-1 1-1 1-1 9 7 1-1
```

8

```
 0 0 0 0 0 0 0 0 4 4 4 4-4-4 4 4
 0 0 0 0 0 0 0 0-4-4-4-4 4 4-4-4
 0 0 0 0 0 0 0 0 4 4 4 4 4 4-4-4
 0 0 0 0 0 0 0 0-4-4-4-4-4-4 4 4
 0 0 0 0 0 0 0 0-4-4 4 4 4 4 4 4
 0 0 0 0 0 0 0 0 4 4-4-4-4-4-4-4
 0 0 0 0 0 0 0 0 4 4-4-4 4 4 4 4
 0 0 0 0 0 0 0 0-4-4 4 4-4-4-4-4
 4 4 4 4-4-4 4 4 0 0 0 0 0 0 0 0
-4-4-4-4 4 4-4-4 0 0 0 0 0 0 0 0
 4 4 4 4 4 4-4-4 0 0 0 0 0 0 0 0
-4-4-4-4-4-4 4 4 0 0 0 0 0 0 0 0
-4-4 4 4 4 4 4 4 4 0 0 0 0 0 0 0 0
 4 4-4-4-4-4-4-4 0 0 0 0 0 0 0 0
 4 4-4-4 4 4 4 4 0 0 0 0 0 0 0 0
-4-4 4 4-4-4-4-4 0 0 0 0 0 0 0 0
```

9

```
 1 1-5-5 3 3 1 1-1-1-3-3-3-3-1-1
-1-1 5 5-3-3-1-1 1 1 3 3 3 3 1 1
-3-3 3 3-1-1 1 1-5-5-3-3 1 1-1-1
 3 3-3-3 1 1-1-1 5 5 3 3-1-1 1 1
-3-3-1-1-1-1-3-3 3 3 1 1 1 1-5-5
 3 3 1 1 1 1 3 3-3-3-1-1-1-1 5 5
 1 1-1-1-5-5-3-3-1-1 1 1-3-3 3 3
-1-1 1 1 5 5 3 3 1 1-1-1 3 3-3-3
 1 1 3 3 3 3 1 1-1-1 5 5-3-3-1-1
-1-1-3-3-3-3-1-1 1 1-5-5 3 3 1 1
 5 5 3 3-1-1 1 1 3 3-3-3 1 1-1-1
-5-5-3-3 1 1-1-1-3-3 3 3-1-1 1 1
-3-3-1-1-1-1 5 5 3 3 1 1 1 1 3 3
 3 3 1 1 1 1-5-5-3-3-1-1-1-1-3-3
 1 1-1-1 3 3-3-3-1-1 1 1 5 5 3 3
-1-1 1 1-3-3 3 3 1 1-1-1-5-5-3-3
```

10

```
 2 2-2-2 2 2-2-2 0 0 0 0 4 4 4 4
-2-2 2 2-2-2 2 2 0 0 0 0-4-4-4-4
-2-2 2 2-2-2 2 2 4 4 4 4 0 0 0 0
 2 2-2-2 2 2-2-2-4-4-4-4 0 0 0 0
-2-2 2 2-2-2 2 2-4-4-4-4 0 0 0 0
 2 2-2-2 2 2-2-2 4 4 4 4 0 0 0 0
 2 2-2-2 2 2-2-2 0 0 0 0-4-4-4-4
-2-2 2 2-2-2 2 2 0 0 0 0 4 4 4 4
 0 0 0 0 4 4 4 4 2 2-2-2 2 2-2-2
 0 0 0 0-4-4-4-4-2-2 2 2-2-2 2 2
 4 4 4 4 0 0 0 0-2-2 2 2-2-2 2 2
-4-4-4-4 0 0 0 0 2 2-2-2 2 2-2-2
-4-4-4-4 0 0 0 0-2-2 2 2-2-2 2 2
 4 4 4 4 0 0 0 0 2 2-2-2 2 2-2-2
 0 0 0 0-4-4-4-4 2 2-2-2 2 2-2-2
 0 0 0 0 4 4 4 4-2-2 2 2-2-2 2 2
```

11

```
 1 1-1-1-3-3-5-5 1 1-1-1 1 1-1-1
-1-1 1 1 3 3 5 5-1-1 1 1-1-1 1 1
-3-3-1-1 1 1 3 3-3-3-1-1-3-3-1-1
 3 3 1 1-1-1-3-3 3 3 1 1 3 3 1 1
-1-1 1 1-1-1 1 1 3 3 5 5-1-1 1 1
 1 1-1-1 1 1-1-1-3-3-5-5 1 1-1-1
 3 3 1 1 3 3 1 1-1-1-3-3 3 3 1 1
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-1-1 1 1-1-1 1 1-1-1 1 1 3 3 5 5
 1 1-1-1 1 1-1-1 1 1-1-1-3-3-5-5
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-3-3-1-1-3-3-1-1-3-3-1-1 1 1 3 3
-3-3-5-5 1 1-1-1 1 1-1-1 1 1-1-1
 3 3 5 5-1-1 1 1-1-1 1 1-1-1 1 1
 1 1 3 3-3-3-1-1-3-3-1-1-3-3-1-1
-1-1-3-3 3 3 1 1 3 3 1 1 3 3 1 1
```

```
              12                                  13
 2 2 2 2-2-2-2-2-2-2-2-2-2-2-2-2-2-2    3 3 3 3 1 1 1 1 1 1 1 1-1-1-1-1
-2-2-2-2 2 2 2 2 2 2 2 2 2 2 2 2 2 2   -3-3-3-3-1-1-1-1-1-1-1-1 1 1 1 1
-2-2-2-2 2 2 2 2 2 2 2 2 2 2 2 2 2 2   -3-3-3-3-1-1-1-1-1-1-1-1 1 1 1 1
 2 2 2 2-2-2-2-2-2-2-2-2-2-2-2-2-2-2    3 3 3 3 1 1 1 1 1 1 1 1-1-1-1-1
-2-2-2-2 2 2 2 2-2-2-2-2-2-2-2-2-2-2   -1-1-1-1 1 1 1 1 1 1 1 1 3 3 3 3
 2 2 2 2-2-2-2-2 2 2 2 2 2 2 2 2 2 2    1 1 1 1-1-1-1-1-1-1-1-1-3-3-3-3
 2 2 2 2-2-2-2-2 2 2 2 2 2 2 2 2 2 2    1 1 1 1-1-1-1-1-1-1-1-1-3-3-3-3
-2-2-2-2 2 2 2 2-2-2-2-2-2-2-2-2-2-2   -1-1-1-1 1 1 1 1 1 1 1 1 3 3 3 3
-2-2-2-2-2-2-2-2 2 2 2 2-2-2-2-2-2-2   -1-1-1-1 1 1 1 1-3-3-3-3-1-1-1-1
 2 2 2 2 2 2 2 2 2-2-2-2-2 2 2 2 2 2    1 1 1 1-1-1-1-1 3 3 3 3 1 1 1 1
 2 2 2 2 2 2 2 2 2-2-2-2-2 2 2 2 2 2    1 1 1 1-1-1-1-1 3 3 3 3 1 1 1 1
-2-2-2-2-2-2-2-2 2 2 2 2-2-2-2-2-2-2   -1-1-1-1 1 1 1 1-3-3-3-3-1-1-1-1
-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2 2 2 2   -1-1-1-1-3-3-3-3 1 1 1 1-1-1-1-1
 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2-2-2-2    1 1 1 1 3 3 3 3-1-1-1-1 1 1 1 1
 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2-2-2-2    1 1 1 1 3 3 3 3-1-1-1-1 1 1 1 1
-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2 2 2 2   -1-1-1-1-3-3-3-3 1 1 1 1-1-1-1-1

              14                                  15
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

code=020E$_H$

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X 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0    7 1 5 3 5-5-1 1 1-1 3-3 3 5-7-1
0 X 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   -1 5 5 7-3 7-1-3 1 3-5 1 3 1 1-5
0 0 X 0 0 0 0 0 0 0 0 0 0 0 0 0 0    7 1 5-5-3 3 7 1 1-1 3 5-5-3 1-1
0 0 0 X 0 0 0 0 0 0 0 0 0 0 0 0 0   -1 5-3 7 5-1-1 5 1 3 3 1-5-7 1 3
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0 0 0 0 0 X 0 0 0 0 0 0 0 0 0 0 0    3 1 1-5 1 3-5 1-3 7-1-3-1 5 5 7
0 0 0 0 0 0 X 0 0 0 0 0 0 0 0 0 0   -5-3 1-1 1-1 3 5-3 3 7 1 7 1 5-5
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0 0 0 0 0 0 0 0 X 0 0 0 0 0 0 0 0   -1 1-3 3-3-5 7 1-7-1-5-3-5 5 1-1
0 0 0 0 0 0 0 0 0 X 0 0 0 0 0 0 0   -1-3 5-1-3-1-1 5 1-5-5-7 3-7 1 3
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0 0 0 0 0 0 0 0 0 0 0 X 0 0 0 0 0   -1-3-3-1 5 7-1-3 1-5 3-7-5 1 1-5
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0 0 0 0 0 0 0 0 0 0 0 0 0 X 0 0 0    3-7 1 3 1-5-5-7-3-1-1 5-1-3 5-1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 X 0 0    3-3-7-1-7-1-5 5 5 3-1 1-1 1-3-5
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X 0   -5 1 1-5 1-5 3-7 5 7-1-3-1-3-3-1
```

2

```
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 4 4 4 4-4 4-4 4-2 2 2-2-6-2 6 2
 4-4 4-4 4 4 4 4-2 2 2-2 2 6-2-6
-4 4-4 4 4 4 4 4 6 2-6-2 2-2-2 2
-4 4-4 4-4-4-4-4-2 2 2-2 2 6-2-6
 4-4 4-4-4-4-4-4 6 2-6-2 2-2-2 2
-4-4-4-4-4 4-4 4-2-6 2 6 2-2-2 2
-4-4-4-4 4-4 4-4-2 2 2-2-6-2 6 2
-2-6 2 6 2-2-2 2 4 4 4 4 4-4 4-4
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 6 2-6-2 2-2-2 2-4 4-4 4 4 4 4 4
-2 2 2-2 2 6-2-6-4 4-4 4-4-4-4-4
 6 2-6-2 2-2-2 2 4-4 4-4-4-4-4-4
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```

3

```
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 5-1 3 1 1 3-1 5 5 7-5 1-3-1-5 1
 5-5 3-3 1-1-1 1-3-5 3 5 5 3 3 5
-7 3-1 5-3-1 3 1 1 3-1-3 1 3 7 5
-1 1 1 7-1 1-7-1-5-3-3 3-1-7 1-1
 3 1 5-1-5-7 5-1-1-3 1-5-5 1-3-1
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-1-3-7-5-1-3 1 3 3 1-3-1 7-3 1-5
-1 1-7-1-1 1 1 7-1-7 1-1-5-3-3 3
-5-7 5-1 3 1 5-1-5 1-3-1-1-3 1-5
 3 5-3-5-5-3-3-5-5 5-3 3-1 1 1-1
-1-3 1 3-1-3-7-5 7-3 1-5 3 1-3-1
 5 3 3-3 1 7-1 1 1-1-1-7 1-1 7 1
 1 3-1 5 5-1 3 1-3-1-5 1 5 7-5 1
 1-1-1 1 5-5 3-3 5 3 3 5-3-5 3 5
-3-1 3 1-7 3-1 5 1 3 7 5 1 3-1-3
```

4

```
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 2-2 6 2 2-2 6 2 2-2-2-6-2 2 2 6
 2-2-2-6 2-2-2-6 2-2 6 2-2 2-6-2
-6-2-2 2-6-2-2 2 2 6-2 2-2-6 2-2
 2 6-2 2 2 6-2 2 6 2 2-2-6-2-2 2
 2-2 6 2 2-2 6 2-2 2 2 6 2-2-2-6
 2-2-2-6 2-2-2-6-2 2-6-2 2-2 6 2
-6-2-2 2-6-2-2 2-2-6 2-2 2 6-2 2
-6-2-2 2 6 2 2-2 2 6-2 2 2 6-2 2
 2-2-2-6-2 2 2 6 2-2 6 2 2-2 6 2
 2-2 6 2-2 2-6-2 2-2-2-6 2-2-2-6
 2 6-2 2-2-6 2-2-6-2-2 2-6-2-2 2
 6 2 2-2-6-2-2 2 2 6-2 2 2 6-2 2
-2 2 2 6 2-2-2-6 2-2 6 2 2-2 6 2
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-2-6 2-2 2 6-2 2-6-2-2 2-6-2-2 2
```

5

```
 1 3 1 3-1 5-9-3 3 1 3 1 1 3 1 3
 1-1 1-1-1-7 7 1 3 5 3 5 1-1 1-1
 3 1-1-3 5-1 1-5-7-5-3-1 3 1-1-3
-5-3-1 1-3 3 1 7 1-1-3-5-5-3-1 1
 1 3 1 3 3 1 3 1-1 5-9-3 1 3 1 3
 1-1 1-1 3 5 3 5-1-7 7 1 1-1 1-1
 3 1-1-3-7-5-3-1 5-1 1-5 3 1-1-3
-5-3-1 1 1-1-3-5-3 3 1 7-5-3-1 1
-3-1-3-1-1-3-1-3-1-3-1-3 1-5 9 3
-3-5-3-5-1 1-1 1-1 1-1 1 1 7-7-1
 7 5 3 1-3-1 1 3-3-1 1 3-5 1-1 5
-1 1 3 5 5 3 1-1 5 3 1-1 3-3-1-7
 1-5 9 3-1-3-1-3-1-3-1-3-3-1-3-1
 1 7-7-1-1 1-1 1-1 1-1 1-3-5-3-5
-5 1-1 5-3-1 1 3-3-1 1 3 7 5 3 1
 3-3-1-7 5 3 1-1 5 3 1-1-1 1 3 5
```

6

```
 4 4 0 0 0 0-4-4-2 2-6-2-6-2-2 2
-4-4 0 0 0 0 4 4-2-6 2-2 2-2-2-6
 4 4 0 0 0 0-4-4 2-2 6 2 6 2 2-2
-4-4 0 0 0 0 4 4 2 6-2 2-2 2 2 6
 0 0 4 4-4-4 0 0 6 2 2-2 2-2 6 2
 0 0-4-4 4 4 0 0-2 2 2 6 2 6-2 2
 0 0 4 4-4-4 0 0-6-2-2 2-2 2-6-2
 0 0-4-4 4 4 0 0 2-2-2-6-2-6 2-2
-2 2-6-2-6-2-2 2 4 4 0 0 0 0-4-4
-2-6 2-2 2-2-2-6-4-4 0 0 0 0 4 4
 2-2 6 2 6 2 2-2 4 4 0 0 0 0-4-4
 2 6-2 2-2 2 2 6-4-4 0 0 0 0 4 4
 6 2 2-2 2-2 6 2 0 0 4 4-4-4 0 0
-2 2 2 6 2 6-2 2 0 0-4-4 4 4 0 0
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 2-2-2-6-2-6 2-2 0 0-4-4 4 4 0 0
```

7

```
 5 3 5 3 1-1 1-1 5 3-3-5 1-1 1-1
-3-1-3-1 1 3 1 3-3-1 5 7 1 3 1 3
 3 5-1 1-1 1-5-3-5-3-1 1-1 1-5-3
-5-7-1-3-1-3 3 1 3 1-1-3-1-3 3 1
-1 1-1 1-5-3 3 5-1 1-1 1-5-3-5-3
-1-3-1-3 3 1-5-7-1-3-1-3 3 1 3 1
 1-1 5 3 5 3 1-1 1-1 5 3-3-5 1-1
 1 3-3-1-3-1 1 3 1 3-3-1 5 7 1 3
-5-3 3 5-1 1-1 1-5-3-5-3-1 1-1 1
 3 1-5-7-1-3-1-3 3 1 3 1-1-3-1-3
 5 3 1-1 1-1 5 3-3-5 1-1 1-1 5 3
-3-1 1 3 1 3-3-1 5 7 1 3 1 3-3-1
 1-1 1-1 5 3 5 3 1-1 1-1 5 3-3-5
 1 3 1 3-3-1-3-1 1 3 1 3-3-1 5 7
-1 1-5-3 3 5-1 1-1 1-5-3-5-3-1 1
-1-3 3 1-5-7-1-3-1-3 3 1 3 1-1-3
```

8

```
 4 4 4 4-4-4 4 4 0 0 0 0 0 0 0 0
-4-4-4-4 4 4-4-4 0 0 0 0 0 0 0 0
 4 4 4 4 4 4 4-4-4 0 0 0 0 0 0 0 0
-4-4-4-4-4-4 4 4 0 0 0 0 0 0 0 0
-4-4 4 4 4 4 4 4 4 0 0 0 0 0 0 0 0
 4 4-4-4-4-4-4-4 0 0 0 0 0 0 0 0
 4 4-4-4 4 4 4 4 4 0 0 0 0 0 0 0 0
-4-4 4 4-4-4-4-4-4 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 4 4 4 4-4-4 4 4
 0 0 0 0 0 0 0 0-4-4-4-4-4 4 4-4-4
 0 0 0 0 0 0 0 0 4 4 4 4 4 4 4-4-4
 0 0 0 0 0 0 0 0-4-4-4-4-4-4-4 4 4
 0 0 0 0 0 0 0 0 4-4-4-4-4-4-4-4-4
 0 0 0 0 0 0 0 0 4 4-4-4 4 4 4 4 4
 0 0 0 0 0 0 0 0-4-4 4 4-4-4-4-4-4
```

9

```
-1-1 5 5 1 1 3 3 1 1 3 3-1-1-3-3
 1 1-5-5-1-1-3-3-1-1-3-3 1 1 3 3
 7 7 1 1 1 1-1-1 1 1-1-1-1-1 1 1
-7-7-1-1-1-1 1 1-1-1 1 1 1 1-1-1
-1-1-3-3 1 1 3 3 1 1 3 3-1-1 5 5
 1 1 3 3-1-1-3-3-1-1-3-3 1 1-5-5
-1-1 1 1 1 1-1-1 1 1-1-1 7 7 1 1
 1 1-1-1-1-1 1 1-1-1 1 1-7-7-1-1
-1-1-3-3 1 1 3 3 1 1-5-5-1-1-3-3
 1 1 3 3-1-1-3-3-1-1 5 5 1 1 3 3
-1-1 1 1 1 1-1-1-7-7-1-1-1-1 1 1
 1 1-1-1-1-1 1 1 7 7 1 1 1 1-1-1
-1-1-3-3 1 1-5-5 1 1 3 3-1-1-3-3
 1 1 3 3-1-1 5 5-1-1-3-3 1 1 3 3
-1-1 1 1-7-7-1-1 1 1-1-1-1-1 1 1
 1 1-1-1 7 7 1 1-1-1 1 1 1 1-1-1
```

10

```
 0 0 0 0 4 4 4 4-2-2 2 2-2-2 2 2
 0 0 0 0-4-4-4-4 2 2-2-2 2 2-2-2
 4 4 4 4 0 0 0 0 2 2-2-2 2 2-2-2
-4-4-4-4 0 0 0 0-2-2 2 2-2-2 2 2
-4-4-4-4 0 0 0 0 2 2-2-2 2 2-2-2
 4 4 4 4 0 0 0 0-2-2 2 2-2-2 2 2
 0 0 0 0-4-4-4-4-2-2 2 2-2-2 2 2
 0 0 0 0 4 4 4 4 2 2-2-2 2 2-2-2
-2-2 2 2-2-2 2 2 0 0 0 0 4 4 4 4
 2 2-2-2 2 2-2-2 0 0 0 0-4-4-4-4
 2 2-2-2 2 2-2-2 4 4 4 4 0 0 0 0
-2-2 2 2-2-2 2 2-4-4-4-4 0 0 0 0
 2 2-2-2 2 2-2-2-4-4-4-4 0 0 0 0
-2-2 2 2-2-2 2 2 4 4 4 4 0 0 0 0
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 2 2-2-2 2 2-2-2 0 0 0 0 4 4 4 4
```

11

```
-1-1-3-3 3 3 1 1 3 3 1 1 3 3 1 1
 1 1 3 3-3-3-1-1-3-3-1-1-3-3-1-1
 3 3 5 5-1-1 1 1-1-1 1 1-1-1 1 1
-3-3-5-5 1 1-1-1 1 1-1-1 1 1-1-1
-3-3-1-1-3-3-1-1-3-3-1-1 1 1 3 3
 3 3 1 1 3 3 1 1 3 3 1 1-1-1-3-3
 1 1-1-1 1 1-1-1 1 1-1-1-3-3-5-5
-1-1 1 1-1-1 1 1-1-1 1 1 3 3 5 5
-3-3-1-1-3-3-1-1 1 1 3 3-3-3-1-1
 3 3 1 1 3 3 1 1-1-1-3-3 3 3 1 1
 1 1-1-1 1 1-1-1-3-3-5-5 1 1-1-1
-1-1 1 1-1-1 1 1 3 3 5 5-1-1 1 1
 3 3 1 1-1-1-3-3 3 3 1 1 3 3 1 1
-3-3-1-1 1 1 3 3-3-3-1-1-3-3-1-1
-1-1 1 1 3 3 5 5-1-1 1 1-1-1 1 1
 1 1-1-1-3-3-5-5 1 1-1-1 1 1-1-1
```

12

```
-2-2-2-2-2-2-2-2-2-2-2-2-2 2 2 2 2
 2 2 2 2 2 2 2 2 2 2 2 2-2-2-2-2
 2 2 2 2 2 2 2 2 2 2 2 2-2-2-2-2
-2-2-2-2-2-2-2-2-2-2-2-2 2 2 2 2
-2-2-2-2-2-2-2-2 2 2 2 2-2-2-2-2
 2 2 2 2 2 2 2 2-2-2-2-2 2 2 2 2
 2 2 2 2 2 2 2 2-2-2-2-2 2 2 2 2
-2-2-2-2-2-2-2-2 2 2 2 2-2-2-2-2
-2-2-2-2 2 2 2 2-2-2-2-2-2-2-2-2
 2 2 2 2-2-2-2-2 2 2 2 2 2 2 2 2
 2 2 2 2-2-2-2-2 2 2 2 2 2 2 2 2
-2-2-2-2 2 2 2 2-2-2-2-2-2-2-2-2
 2 2 2 2-2-2-2-2-2-2-2-2-2-2-2-2
-2-2-2-2 2 2 2 2 2 2 2 2 2 2 2 2
-2-2-2-2 2 2 2 2 2 2 2 2 2 2 2 2
 2 2 2 2-2-2-2-2-2-2-2-2-2-2-2-2
```

13

```
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 1 1 1 1 3 3 3 3-1-1-1-1 1 1 1 1
-1-1-1-1-3-3-3-3 1 1 1 1-1-1-1-1
-1-1-1-1 1 1 1 1-3-3-3-3-1-1-1-1
 1 1 1 1-1-1-1-1-1 3 3 3 3 1 1 1 1
 1 1 1 1-1-1-1-1-1 3 3 3 3 1 1 1 1
-1-1-1-1 1 1 1 1-3-3-3-3-1-1-1-1
-1-1-1-1 1 1 1 1 1 1 1 1 3 3 3 3
 1 1 1 1-1-1-1-1-1-1-1-1-3-3-3-3
 1 1 1 1-1-1-1-1-1-1-1-1-3-3-3-3
-1-1-1-1 1 1 1 1 1 1 1 1 3 3 3 3
 3 3 3 3 1 1 1 1 1 1 1 1-1-1-1-1
-3-3-3-3-1-1-1-1-1-1-1-1 1 1 1 1
-3-3-3-3-1-1-1-1-1-1-1-1 1 1 1 1
 3 3 3 3 1 1 1 1 1 1 1 1-1-1-1-1
```

```
                14                                  15
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
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code=0461$_H$

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0 X 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0    1 3 7 5-5 1 5-1 7-3 1-5-3-1 3 1
0 0 X 0 0 0 0 0 0 0 0 0 0 0 0 0 0    1 7-1 1 3 5 5-5-1 1 1 7-3 3-5-3
0 0 0 X 0 0 0 0 0 0 0 0 0 0 0 0 0    5-1 3 1 7 5-7 3 3 1 5-1 1-5-1-3
0 0 0 0 X 0 0 0 0 0 0 0 0 0 0 0 0    1-1-1 1-5 5-3 3-1-7 1 7 5 3 3 5
0 0 0 0 0 X 0 0 0 0 0 0 0 0 0 0 0   -3-1 3 1 7-3 1-5-5 1 5-1 1 3 7 5
0 0 0 0 0 0 X 0 0 0 0 0 0 0 0 0 0   -3 3-5-3-1 1 1 7 3 5 5-5 1 7-1 1
0 0 0 0 0 0 0 X 0 0 0 0 0 0 0 0 0    1-5-1-3 3 1 5-1 7 5-7 3 5-1 3 1
0 0 0 0 0 0 0 0 X 0 0 0 0 0 0 0 0    5-5 3-3-1 1 1-1-5-3-3-5 1 7-1-7
0 0 0 0 0 0 0 0 0 X 0 0 0 0 0 0 0   -7 3-1 5 3 1-3-1-1-3-7-5 5-1-5 1
0 0 0 0 0 0 0 0 0 0 X 0 0 0 0 0 0    1-1-1-7 3-3 5 3-1-7 1-1-3-5-5 5
0 0 0 0 0 0 0 0 0 0 0 X 0 0 0 0 0   -3-1-5 1-1 5 1 3-5 1-3-1-7-5 7-3
0 0 0 0 0 0 0 0 0 0 0 0 X 0 0 0 0    1 7-1-7-5-3-3-5-1 1 1-1 5-5 3-3
0 0 0 0 0 0 0 0 0 0 0 0 0 X 0 0 0    5-1-5 1-1-3-7-5 3 1-3-1-7 3-1 5
0 0 0 0 0 0 0 0 0 0 0 0 0 0 X 0 0   -3-5-5 5-1-7 1-1 3-3 5 3 1-1-1-7
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X 0   -7-5 7-3-5 1-3-1-1 5 1 3-3-1-5 1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X

                 2                                   3
 0 4 0 4 0 4 0 4 6 6-6 2 2-6-2-2   -1 1 5 3 3 5 1-1-1 1-3-5 7 1 5-5
 4 0 4 0 4 0 4 0 2 2 6-2-2 6-6-6    7 5-3-1 3 1 1 3-1-3-3-1-1 5-3 7
 0 4 0 4 0 4 0 4-2-2 2-6-6 2 6 6   -1-7 5 3 3-3 1-1 7 1 5 3-1 1-3 3
 4 0 4 0 4 0 4 0-6-6-2 6 6-2 2 2   -1 5-3-1-5 1 1 3-1 5 5 7-1-3 5-1
 0-4 0-4 0-4 0-4-2 6 2 2-6-6 6-2   -7-1-5 5 1-1 3 5-3-5-1 1 1-1-5-3
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 0-4 0-4 0-4 0-4 6-2-6-6 2 2-2 6    1-1 3-3-7-1-5-3-3 3-1 1 1 7-5-3
-4 0-4 0-4 0-4 0-6 2-2-2 6 6 2-6    1 3-5 1 1-5-5-7 5-1-1-3 1-5 3 1
 6 6-6 2 2-6-2-2 0 4 0 4 0 4 0 4    1-1 3 5-7-1-5 5 1-1-5-3-3-5-1 1
 2 2 6-2-2 6-6-6 4 0 4 0 4 0 4 0    1 3 3 1 1-5 3-7-7-5 3 1-3-1-1-3
-2-2 2-6-6 2 6 6 0 4 0 4 0 4 0 4   -7-1-5-3 1-1 3-3 1 7-5-3-3 3-1 1
-6-6-2 6 6-2 2 2 4 0 4 0 4 0 4 0    1-5-5-7 1 3-5 1 1-5 3 1 5-1-1-3
-2 6 2 2-6-6 6-2 0-4 0-4 0-4 0-4    3 5 1-1-1 1 5 3 7 1 5-5-1 1-3-5
 2-6 6 6-2-2-6 2-4 0-4 0-4 0-4 0    3 1 1 3 7 5-3-1-1 5-3 7-1-3-3-1
 6-2-6-6 2 2-2 6 0-4 0-4 0-4 0-4    3-3 1-1-1-7 5 3-1 1-3 3 7 1 5 3
-6 2-2-2 6 6 2-6-4 0-4 0-4 0-4 0   -5 1 1 3-1 5-3-1-1-3 5-1-1 5 5 7
```

4

```
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 2-2 6 2-6-2-2 2 2 6-2 2-2 2 2 6
 2-2-2-6 2 6-2 2-6-2-2 2-2 2-6-2
-6-2-2 2 2-2 6 2 2-2-2-6-2-6 2-2
 2-2-2-6 2 6-2 2 6 2 2-2 2-2 6 2
-6-2-2 2 2-2 6 2-2 2 2 6 2 6-2 2
 2 6-2 2 2-2-2-6-2 2-6-2-6-2-2 2
 2-2 6 2-6-2-2 2-2-6 2-2 2-2-2-6
 2-2 6 2 6 2 2-2 2 6-2 2 2-2-2-6
 2 6-2 2-2 2 2 6 2-2 6 2-6-2-2 2
-6-2-2 2-2 2-6-2 2-2-2-6 2 6-2 2
 2-2-2-6-2-6 2-2-6-2-2 2 2-2 6 2
 6 2 2-2 2-2 6 2 2-2-2-6 2 6-2 2
-2 2 2 6 2 6-2 2-6-2-2 2 2-2 6 2
-2 2-6-2-6-2-2 2 2 6-2 2 2-2-2-6
-2-6 2-2 2-2-2-6 2-2 6 2-6-2-2 2
```

5

```
 5 3 1-1-5-3-1 1-1-7 3-3-3-5 1-1
-3-1 1 3 3 1-1-3-1 5-5 1-3-1-7-5
-1 1-1 1 1-1 1-1-3 3-3 3-1 1 7 9
-1-3-1-3 1 3 1 3 5-1 5-1 7 5-1-3
-3-5 1-1-1-7 3-3-5-3-1 1 5 3 1-1
-3-1-7-5-1 5-5 1 3 1-1-3-3-1 1 3
-1 1 7 9-3 3-3 3 1-1 1-1-1 1-1 1
 7 5-1-3 5-1 5-1 1 3 1 3-1-3-1-3
 1 7-3 3 3 5-1 1-5-3-1 1 5 3 1-1
 1-5 5-1 3 1 7 5 3 1-1-3-3-1 1 3
 3-3 3-3 1-1-7-9 1-1 1-1-1 1-1 1
-5 1-5 1-7-5 1 3 1 3 1 3-1-3-1-3
 5 3 1-1-5-3-1 1 3 5-1 1 1 7-3 3
-3-1 1 3 3 1-1-3 3 1 7 5 1-5 5-1
-1 1-1 1 1-1 1-1 1-1-7-9 3-3 3-3
-1-3-1-3 1 3 1 3-7-5 1 3-5 1-5 1
```

6

```
 4 0 4 0 0-4 8 4 2 2 2 2-2-2-2-2
 0 4 0 4 4 8-4 0-2-2-2-2 2 2 2 2
-8-4 0 4-4 0-4 0 2 2 2 2-2-2-2-2
 4 0-4-8 0-4 0-4-2-2-2-2 2 2 2 2
 0 4-8-4-4 0-4 0 2 2 2 2-2-2-2-2
-4-8 4 0 0-4 0-4-2-2-2-2 2 2 2 2
 4 0 4 0 8 4 0-4 2 2 2 2-2-2-2-2
 0 4 0 4-4 0 4 8-2-2-2-2 2 2 2 2
 2 2 2 2-2-2-2-2 4 0 4 0 0-4 8 4
-2-2-2-2 2 2 2 2 0 4 0 4 4 8-4 0
 2 2 2 2-2-2-2-2-8-4 0 4-4 0-4 0
-2-2-2-2 2 2 2 2 4 0-4-8 0-4 0-4
 2 2 2 2-2-2-2-2 0 4-8-4-4 0-4 0
-2-2-2-2 2 2 2 2-4-8 4 0 0-4 0-4
 2 2 2 2-2-2-2-2 4 0 4 0 8 4 0-4
-2-2-2-2 2 2 2 2 0 4 0 4-4 0 4 8
```

7

```
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-1-3-1-3 7 5-1-3-1-3-1-3-1-3-1-3
-1 1-1 1-9-7-1 1-1 1-1 1-1 1-1 1
-1-3 3 1-1-3 3 1-1-3-5-7-1-3 3 1
-1 1-5-3-1 1-5-3-1 1 3 5-1 1-5-3
 1 3 1 3 1 3 1 3-7-5 1 3 1 3 1 3
 1-1 1-1 1-1 1-1 9 7 1-1 1-1 1-1
-1-3 3 1-1-3 3 1-1-3 3 1-1-3-5-7
-1 1-5-3-1 1-5-3-1 1-5-3-1 1 3 5
 1 3 1 3 1 3 1 3 1 3 1 3-7-5 1 3
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 1 3 5 7 1 3-3-1 1 3-3-1 1 3-3-1
 1-1-3-5 1-1 5 3 1-1 5 3 1-1 5 3
 7 5-1-3-1-3-1-3-1-3-1-3-1-3-1-3
-9-7-1 1-1 1-1 1-1 1-1 1-1 1-1 1
```

8

```
 0 0 0 0 0 0 0 0 4 4-4-4 4 4 4 4
 0 0 0 0 0 0 0 0-4-4 4 4-4-4-4-4
 0 0 0 0 0 0 0 0-4-4 4 4 4 4 4 4
 0 0 0 0 0 0 0 0 4 4-4-4-4-4-4-4
 0 0 0 0 0 0 0 0 4 4 4 4 4 4-4-4
 0 0 0 0 0 0 0 0-4-4-4-4-4-4 4 4
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 0 0 0 0 0 0 0 0-4-4-4-4 4 4-4-4
 4 4-4-4 4 4 4 4 4 0 0 0 0 0 0 0 0
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-4-4 4 4 4 4 4 4 4 0 0 0 0 0 0 0 0
 4 4-4-4-4-4-4-4 0 0 0 0 0 0 0 0
 4 4 4 4 4 4-4-4 0 0 0 0 0 0 0 0
-4-4-4-4-4-4 4 4 0 0 0 0 0 0 0 0
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-4-4-4-4 4 4-4-4 0 0 0 0 0 0 0 0
```

9

```
-1-1 1 1-3-3-5-5 1 1-1-1 3 3-3-3
 1 1-1-1 3 3 5 5-1-1 1 1-3-3 3 3
-1-1-3-3-3-3-1-1 1 1 3 3-5-5 1 1
 1 1 3 3 3 3 1 1-1-1-3-3 5 5-1-1
 3 3-3-3 1 1-1-1-3-3-5-5-1-1 1 1
-3-3 3 3-1-1 1 1 3 3 5 5 1 1-1-1
-5-5 1 1 1 1 3 3-3-3-1-1-1-1-3-3
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-1-1 1 1-3-3 3 3 1 1-1-1 3 3 5 5
 1 1-1-1 3 3-3-3-1-1 1 1-3-3-5-5
-1-1-3-3 5 5-1-1 1 1 3 3 3 3 1 1
 1 1 3 3-5-5 1 1-1-1-3-3-3-3-1-1
 3 3 5 5 1 1-1-1-3-3 3 3-1-1 1 1
-3-3-5-5-1-1 1 1 3 3-3-3 1 1-1-1
 3 3 1 1 1 1 3 3 5 5-1-1-1-1-3-3
-3-3-1-1-1-1-3-3-5-5 1 1 1 1 3 3
```

10

```
 4 4 0 0 0 0-4-4-2-2-2-2-2-2-2-2
-4-4 0 0 0 0 4 4 2 2 2 2 2 2 2 2
-4-4 0 0 0 0 4 4-2-2-2-2-2-2-2-2
 4 4 0 0 0 0-4-4 2 2 2 2 2 2 2 2
 0 0 4 4-4-4 0 0 2 2 2 2 2 2 2 2
 0 0-4-4 4 4 0 0-2-2-2-2-2-2-2-2
 0 0-4-4 4 4 0 0 2 2 2 2 2 2 2 2
 0 0 4 4-4-4 0 0-2-2-2-2-2-2-2-2
-2-2-2-2-2-2-2-2 4 4 0 0 0 0-4-4
 2 2 2 2 2 2 2 2-4-4 0 0 0 0 4 4
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 2 2 2 2 2 2 2 2 0 0 4 4-4-4 0 0
-2-2-2-2-2-2-2-2 0 0-4-4 4 4 0 0
 2 2 2 2 2 2 2 2 0 0-4-4 4 4 0 0
-2-2-2-2-2-2-2-2 0 0 4 4-4-4 0 0
```

11

```
 3 3 5 5-1-1 1 1-1-1 1 1-1-1 1 1
-3-3-5-5 1 1-1-1 1 1-1-1 1 1-1-1
-1-1-3-3 3 3 1 1 3 3 1 1 3 3 1 1
 1 1 3 3-3-3-1-1-3-3-1-1-3-3-1-1
 1 1-1-1 1 1-1-1 1 1-1-1-3-3-5-5
-1-1 1 1-1-1 1 1-1-1 1 1 3 3 5 5
-3-3-1-1-3-3-1-1-3-3-1-1 1 1 3 3
 3 3 1 1 3 3 1 1 3 3 1 1-1-1-3-3
 1 1-1-1 1 1-1-1-3-3-5-5 1 1-1-1
-1-1 1 1-1-1 1 1 3 3 5 5-1-1 1 1
-3-3-1-1-3-3-1-1 1 1 3 3-3-3-1-1
 3 3 1 1 3 3 1 1-1-1-3-3 3 3 1 1
-1-1 1 1 3 3 5 5-1-1 1 1-1-1 1 1
 1 1-1-1-3-3-5-5 1 1-1-1 1 1-1-1
 3 3 1 1-1-1-3-3 3 3 1 1 3 3 1 1
-3-3-1-1 1 1 3 3-3-3-1-1-3-3-1-1
```

12

```
 2 2 2 2 2 2 2 2 2 2 2 2-2-2-2-2
-2-2-2-2-2-2-2-2-2-2-2-2 2 2 2 2
-2-2-2-2-2-2-2-2-2-2-2-2 2 2 2 2
 2 2 2 2 2 2 2 2 2 2 2 2-2-2-2-2
 2 2 2 2 2 2 2 2-2-2-2-2 2 2 2 2
-2-2-2-2-2-2-2-2 2 2 2 2-2-2-2-2
-2-2-2-2-2-2-2-2 2 2 2 2-2-2-2-2
 2 2 2 2 2 2 2 2-2-2-2-2 2 2 2 2
 2 2 2 2-2-2-2-2 2 2 2 2 2 2 2 2
-2-2-2-2 2 2 2 2-2-2-2-2-2-2-2-2
-2-2-2-2 2 2 2 2-2-2-2-2-2-2-2-2
 2 2 2 2-2-2-2-2 2 2 2 2 2 2 2 2
-2-2-2-2 2 2 2 2 2 2 2 2 2 2 2 2
 2 2 2 2-2-2-2-2-2-2-2-2-2-2-2-2
 2 2 2 2-2-2-2-2-2-2-2-2-2-2-2-2
-2-2-2-2 2 2 2 2 2 2 2 2 2 2 2 2
```

13

```
 1 1 1 1 3 3 3 3-1-1-1-1 1 1 1 1
-1-1-1-1-3-3-3-3 1 1 1 1-1-1-1-1
-1-1-1-1-3-3-3-3 1 1 1 1-1-1-1-1
 1 1 1 1 3 3 3 3-1-1-1-1 1 1 1 1
 1 1 1 1-1-1-1-1 3 3 3 3 1 1 1 1
-1-1-1-1 1 1 1 1-3-3-3-3-1-1-1-1
-1-1-1-1 1 1 1 1-3-3-3-3-1-1-1-1
 1 1 1 1-1-1-1-1 3 3 3 3 1 1 1 1
 1 1 1 1-1-1-1-1-1-1-1-1-3-3-3-3
-1-1-1-1 1 1 1 1 1 1 1 1 3 3 3 3
-1-1-1-1 1 1 1 1 1 1 1 1 3 3 3 3
 1 1 1 1-1-1-1-1-1-1-1-1-3-3-3-3
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 3 3 3 3 1 1 1 1 1 1 1 1-1-1-1-1
 3 3 3 3 1 1 1 1 1 1 1 1-1-1-1-1
-3-3-3-3-1-1-1-1-1-1-1-1 1 1 1 1
```

14

```
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0
```

15

```
-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
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```

code=0737$_H$

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0 X 0 0 0 0 0 0 0 0 0 0 0 0 0 0    5 7 3 1-1-3 1 3-5 1-3 7 1-5-1 5
0 0 X 0 0 0 0 0 0 0 0 0 0 0 0 0    1-1 7 1 3 5-3 3 7 1 1-1 5-5-5-3
0 0 0 X 0 0 0 0 0 0 0 0 0 0 0 0    1 3-1 5 3 1 5-1-1 5 1 3-3 7-5-7
0 0 0 0 X 0 0 0 0 0 0 0 0 0 0 0   -7-1 7 1 3-3 5-5-1 1 1-1 5 3 3 5
0 0 0 0 0 X 0 0 0 0 0 0 0 0 0 0    1-5-1 5-5 1-3 7-1-3 1 3 5 7 3 1
0 0 0 0 0 0 X 0 0 0 0 0 0 0 0 0    5-5-5-3 7 1 1-1 3 5-3 3 1-1 7 1
0 0 0 0 0 0 0 X 0 0 0 0 0 0 0 0   -3 7-5-7-1 5 1 3 3 1 5-1 1 3-1 5
0 0 0 0 0 0 0 0 X 0 0 0 0 0 0 0   -3 3-5 5 7 1-7-1-5-3-3-5 1-1-1 1
0 0 0 0 0 0 0 0 0 X 0 0 0 0 0 0    5-1 3-7-1 5 1-5-5-7-3-1 1 3-1-3
0 0 0 0 0 0 0 0 0 0 X 0 0 0 0 0   -7-1-1 1-5 5 5 3-1 1-7-1-3-5 3-3
0 0 0 0 0 0 0 0 0 0 0 X 0 0 0 0    1-5-1-3 3-7 5 7-1-3 1-5-3-1-5 1
0 0 0 0 0 0 0 0 0 0 0 0 X 0 0 0    1-1-1 1-5-3-3-5 7 1-7-1-3 3-5 5
0 0 0 0 0 0 0 0 0 0 0 0 0 X 0 0    1 3-1-3-5-7-3-1-1 5 1-5 5-1 3-7
0 0 0 0 0 0 0 0 0 0 0 0 0 0 X 0   -3-5 3-3-1 1-7-1-5 5 5 3-7-1-1 1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X   -3-1-5 1-1-3 1-5 3-7 5 7 1-5-1-3

                2                                3
-2 2 2 6 2 6-2 2-4 4 4 4-4-4 4-4   -1-3 5-1-1 5 5 7-5 1 1 3-1 5-3-1
 6 2 2-2 2-2 6 2 4-4 4 4-4-4-4 4   -1 1-3 3 7 1 5 3 3-3 1-1-1-7 5 3
-2 2 2 6 2 6-2 2 4-4-4-4 4 4-4 4   -1 5-3 7-1-3-3-1 3 1 1 3 7 5-3-1
 6 2 2-2 2-2 6 2-4 4-4-4 4 4 4-4    7 1 5-5-1 1-3-5 3 5 1-1-1 1 5 3
-2-6 2-2 2-2-2-6 4 4-4 4 4-4-4-4    1-5 3 1 5-1-1-3 1-5-5-7 1 3-5 1
-2 2-6-2-6-2-2 2 4 4 4-4-4 4-4-4    1 7-5-3-3 3-1 1-7-1-5-3 1-1 3-3
-2-6 2-2 2-2-2-6-4-4 4-4-4 4 4 4   -7-5 3 1-3-1-1-3 1 3 3 1 1-5 3-7
-2 2-6-2-6-2-2 2-4-4-4 4 4-4 4 4    1-1-5-3-3-5-1 1 1-1 3 5-7-1-5 5
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-6-2-2 2 6 2 2-2-2 2 2 6-2 2 2 6   -5-7-1-3 1-5 5-1-3-1 1 3 3 1-1-3
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6

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7

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-3-1-3-1 1 3 1 3-3-1 5 7 1 3 1 3
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-1-3 3 1-5-7-1-3-1-3 3 1 3 1-1-3
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8

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 0 0 0 0 0 0 0 0-4-4-4-4 4 4-4-4
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9

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 1 1 7 7-1-1 1 1-1-1 1 1 1 1-1-1
-1-1-7-7 1 1-1-1 1 1-1-1-1-1 1 1
 5 5-1-1 3 3 1 1 3 3 1 1-3-3-1-1
-5-5 1 1-3-3-1-1-3-3-1-1 3 3 1 1
 1 1-1-1-1-1-7-7-1-1 1 1 1 1-1-1
-1-1 1 1 1 1 7 7 1 1-1-1-1-1 1 1
-3-3-1-1-5-5 1 1 3 3 1 1-3-3-1-1
 3 3 1 1 5 5-1-1-3-3-1-1 3 3 1 1
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10

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11

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-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
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0 0 X 0 0 0 0 0 0 0 0 0 0 0 0 0 0    1-1 3 5-5 5 1 7-1-7-3 3 5 3-1 1
0 0 0 X 0 0 0 0 0 0 0 0 0 0 0 0 0   -3-1 7 5 7-3 5-1-5 1 1-5 1 3 3 1
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2

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3

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 1-1 7 1 1-1-1-7 1 7-1 1 5 3 3-3
 3 1-3-1 7-3 1-5-1-3-7-5-1-3 1 3
-1 1 1-1-5 5-3 3-5-3-3-5 3 5-3-5
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4

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 6 2 2-2 2-2 6 2-2-6 2-2-2 2 2 6
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5

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-5-3-1 1 1-1-3-5 1-1-3-5 7 1 3-3
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 1 7-7-1-1 1-1 1-1 1-1 1 5 3 5 3
-5 1-1 5-3-1 1 3-3-1 1 3-1-3-5-7
 7 1 3-3 1-1-3-5 1-1-3-5-5-3-1 1
-3-1-3-1 3 9-5 1-1-3-1-3-3-1-3-1
 1-1 1-1-1-7 7 1-5-3-5-3 1-1 1-1
 3 1-1-3 5-1 1-5 1 3 5 7 3 1-1-3
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 1-1 1-1-5-3-5-3-1-7 7 1 1-1 1-1
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6

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 0 4-4 0-4 0-8-4 2 2-2-2-2-2 2 2
-4-8 0-4 0-4 4 0-2-2 2 2 2 2-2-2
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 0-4-4-8 4 0 0-4 2 2-2-2-2-2 2 2
 4 0 8 4 0-4 4 0 2 2-2-2-2-2 2 2
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7

```
 1 3-3-1 1 3 5 7 1 3-3-1 1 3-3-1
 1-1 5 3 1-1-3-5 1-1 5 3 1-1 5 3
-1-3-1-3 7 5-1-3-1-3-1-3-1-3-1-3
-1 1-1 1-9-7-1 1-1 1-1 1-1 1-1 1
-1-3 3 1-1-3 3 1-1-3-5-7-1-3 3 1
-1 1-5-3-1 1-5-3-1 1 3 5-1 1-5-3
 1 3 1 3 1 3 1 3-7-5 1 3 1 3 1 3
 1-1 1-1 1-1 1-1 9 7 1-1 1-1 1-1
-1-3 3 1-1-3 3 1-1-3 3 1-1-3-5-7
-1 1-5-3-1 1-5-3-1 1-5-3-1 1 3 5
 1 3 1 3 1 3 1 3-7-5 1 3 1 3 1 3
 1-1 1-1 1-1 1-1 1-1 1-1 9 7 1-1
 1 3 5 7 1 3-3-1 1 3-3-1 1 3-3-1
 1-1-3-5 1-1 5 3 1-1 5 3 1-1 5 3
 7 5-1-3-1-3-1-3-1-3-1-3-1-3-1-3
-9-7-1 1-1 1-1 1-1 1-1 1-1 1-1 1
```

8

```
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 0 0 0 0 0 0 0 0-4-4-4-4-4-4 4 4
 0 0 0 0 0 0 0 0-4-4 4 4 4 4 4 4
 0 0 0 0 0 0 0 0 4 4-4-4-4-4-4-4
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 0 0 0 0 0 0 0 0-4-4 4 4-4-4-4-4
 4 4 4 4-4-4 4 4 0 0 0 0 0 0 0 0
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-4-4-4-4-4-4 4 4 0 0 0 0 0 0 0 0
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 4 4-4-4 4 4 4 4 0 0 0 0 0 0 0 0
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```

9

```
 3 3 1 1 1 1-5-5-3-3-1-1-1-1-3-3
-3-3-1-1-1-1 5 5 3 3 1 1 1 1 3 3
-1-1 1 1-3-3 3 3 1 1-1-1-5-5-3-3
 1 1-1-1 3 3-3-3-1-1 1 1 5 5 3 3
-1-1-3-3-3-3-1-1 1 1-5-5 3 3 1 1
 1 1 3 3 3 3 1 1-1-1 5 5-3-3-1-1
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 5 5 3 3-1-1 1 1 3 3-3-3 1 1-1-1
 3 3 1 1 1 1 3 3-3-3-1-1-1-1 5 5
-3-3-1-1-1-1-3-3 3 3 1 1 1 1-5-5
-1-1 1 1 5 5 3 3 1 1-1-1 3 3-3-3
 1 1-1-1-5-5-3-3-1-1 1 1-3-3 3 3
-1-1 5 5-3-3-1-1 1 1 3 3 3 3 1 1
 1 1-5-5 3 3 1 1-1-1-3-3-3-3-1-1
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-3-3 3 3-1-1 1 1-5-5-3-3 1 1-1-1
```

10

```
 0 0 0 0 4 4 4 4 2 2-2-2 2 2-2-2
 0 0 0 0-4-4-4-4-2-2 2 2-2-2 2 2
 4 4 4 4 0 0 0 0-2-2 2 2-2-2 2 2
-4-4-4-4 0 0 0 0 2 2-2-2 2 2-2-2
-4-4-4-4 0 0 0 0-2-2 2 2-2-2 2 2
 4 4 4 4 0 0 0 0 2 2-2-2 2 2-2-2
 0 0 0 0-4-4-4-4 2 2-2-2 2 2-2-2
 0 0 0 0 4 4 4 4-2-2 2 2-2-2 2 2
 2 2-2-2 2 2-2-2 0 0 0 0 4 4 4 4
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11

```
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-3-3-5-5 1 1-1-1 1 1-1-1 1 1-1-1
 3 3 5 5-1-1 1 1-1-1 1 1-1-1 1 1
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-1-1-3-3 3 3 1 1 3 3 1 1 3 3 1 1
-1-1 1 1-1-1 1 1-1-1 1 1 3 3 5 5
 1 1-1-1 1 1-1-1 1 1-1-1-3-3-5-5
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```

12

```
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-2-2-2-2 2 2 2 2 2 2 2 2 2 2 2 2
-2-2-2-2 2 2 2 2 2 2 2 2 2 2 2 2
 2 2 2 2-2-2-2-2-2-2-2-2-2-2-2-2
-2-2-2-2 2 2 2 2-2-2-2-2-2-2-2-2
 2 2 2 2-2-2-2-2-2-2-2-2-2 2 2 2
 2 2 2 2-2-2-2-2-2-2-2-2-2 2 2 2
-2-2-2-2 2 2 2 2-2-2-2-2-2-2-2-2
-2-2-2-2-2-2-2-2 2 2 2 2-2-2-2-2
 2 2 2 2 2 2 2 2-2-2-2-2 2 2 2 2
 2 2 2 2 2 2 2 2 2-2-2-2-2 2 2 2
-2-2-2-2-2-2-2-2 2 2 2 2-2-2-2-2
-2-2-2-2-2-2-2-2-2-2-2-2 2 2 2 2
 2 2 2 2 2 2 2 2 2 2 2 2-2-2-2-2
 2 2 2 2 2 2 2 2 2 2 2 2-2-2-2-2
-2-2-2-2-2-2-2-2-2-2-2-2-2 2 2 2
```

13

```
 1 1 1 1 3 3 3 3-1-1-1-1 1 1 1 1
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-1-1-1-1 1 1 1 1 1 1 1 1 3 3 3 3
-1-1-1-1 1 1 1 1 1 1 1 1 3 3 3 3
 1 1 1 1-1-1-1-1-1-1-1-1-3-3-3-3
-3-3-3-3-1-1-1-1-1-1-1-1 1 1 1 1
 3 3 3 3 1 1 1 1 1 1 1 1-1-1-1-1
 3 3 3 3 1 1 1 1 1 1 1 1-1-1-1-1
-3-3-3-3-1-1-1-1-1-1-1-1 1 1 1 1
```

```
                14                                  15
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 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
```

code=131F$_H$

```
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 0 X 0 0 0 0 0 0 0 0 0 0 0 0 0 0   -3 7-1-3-1 5 5 7 3 1 1-5 1 3-5 1
 0 0 X 0 0 0 0 0 0 0 0 0 0 0 0 0   -3 3 7 1 7 1 5-5-5-3 1-1 1-1 3 5
 0 0 0 X 0 0 0 0 0 0 0 0 0 0 0 0    5-1-1 5-1 5-3 7-5-7 1 3 1 3 3 1
 0 0 0 0 X 0 0 0 0 0 0 0 0 0 0 0    1-1 3-3 3 5-7-1 7 1 5 3 5-5-1 1
 0 0 0 0 0 X 0 0 0 0 0 0 0 0 0 0    1 3-5 1 3 1 1-5-1 5 5 7-3 7-1-3
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 0 0 0 0 0 0 0 0 X 0 0 0 0 0 0 0   -3-5 7 1-1 1-3 3-5 5 1-1-7-1-5-3
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 0 0 0 0 0 0 0 0 0 0 0 X 0 0 0 0    5 7-1-3-1-3-3-1-5 1 1-5 1-5 3-7
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 0 0 0 0 0 0 0 0 0 0 0 0 0 X 0 0    1-5-5-7 3-7 1 3-1-3 5-1-3-1-1 5
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X 0   -7-1-5 5 3-3-7-1-1 1-3-5 5 3-1 1
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X    1-5 3-7-5 1 1-5-1-3-3-1 5 7-1-3

                2                                   3
-2-6 2 6 2-2-2 2 4 4 4 4 4-4 4-4   -1 1 1 7-1 1-7-1-5-3-3 3-1-7 1-1
-2 2 2-2-6-2 6 2 4 4 4 4-4 4-4 4    3 1 5-1-5-7 5-1-1-3 1-5-5 1-3-1
-2 2 2-2 2 6-2-6 4-4 4-4 4 4 4 4   -5-3-3-5 3 5-3-5-1 1 1-1-5 5-3 3
 6 2-6-2 2-2-2 2-4 4-4 4 4 4 4 4   -1-3-7-5-1-3 1 3 3 1-3-1 7-3 1-5
-2 2 2-2 2 6-2-6-4 4-4 4-4-4-4-4    1 7-1 1 5 3 3-3 1-1 7 1 1-1-1-7
 6 2-6-2 2-2-2 2 4-4 4-4-4-4-4-4    5-1 3 1 1 3-1 5 5 7-5 1-3-1-5 1
-2-6 2 6 2-2-2 2-4-4-4-4-4 4-4 4    5-5 3-3 1-1-1 1-3-5 3 5 5 3 3 5
-2 2 2-2-6-2 6 2-4-4-4-4 4-4 4-4   -7 3-1 5-3-1 3 1 1 3-1-3 1 3 7 5
 4 4 4 4 4-4 4-4-2-6 2 6 2-2-2 2    5 3 3-3 1 7-1 1 1-1-1-7 1-1 7 1
 4 4 4 4-4 4-4 4-2 2 2-2-6-2 6 2    1 3-1 5 5-1 3 1-3-1-5 1 5 7-5 1
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-4 4-4 4 4 4 4 4 6 2-6-2 2-2-2 2   -3-1 3 1-7 3-1 5 1 3 7 5 1 3-1-3
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 4-4 4-4-4-4-4-4 6 2-6-2 2-2-2 2   -5-7 5-1 3 1 5-1-5 1-3-1-1-3 1-5
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-4-4-4-4 4-4 4-4-2 2 2-2-6-2 6 2   -1-3 1 3-1-3-7-5 7-3 1-5 3 1-3-1
```

4

```
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 2-2-2-6 2-2-2-6 2-2 6 2-2 2-6-2
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 2-2-2-6 2-2-2-6-2 2-6-2 2-2 6 2
-6-2-2 2-6-2-2 2-2-6 2-2 2 6-2 2
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 2-2 6 2-2 2-6-2 2-2-2-6 2-2-2-6
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 6 2 2-2-6-2-2 2 2 6-2 2 2 6-2 2
-2 2 2 6 2-2-2-6 2-2 6 2 2-2 6 2
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-2-6 2-2 2 6-2 2-6-2-2 2-6-2-2 2
```

5

```
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-1-7 7 1 1-1 1-1 1-1 1-1 3 5 3 5
 5-1 1-5 3 1-1-3 3 1-1-3-7-5-3-1
-3 3 1 7-5-3-1 1-5-3-1 1 1-1-3-5
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 3 5 3 5 1-1 1-1 1-1 1-1-1-7 7 1
-7-5-3-1 3 1-1-3 3 1-1-3 5-1 1-5
 1-1-3-5-5-3-1 1-5-3-1 1-3 3 1 7
-1-3-1-3-3-1-3-1 1-5 9 3-1-3-1-3
-1 1-1 1-3-5-3-5 1 7-7-1-1 1-1 1
-3-1 1 3 7 5 3 1-5 1-1 5-3-1 1 3
 5 3 1-1-1 1 3 5 3-3-1-7 5 3 1-1
-1-3-1-3 1-5 9 3-3-1-3-1-1-3-1-3
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 5 3 1-1 3-3-1-7-1 1 3 5 5 3 1-1
```

6

```
-2 2-6-2-6-2-2 2 4 4 0 0 0 0-4-4
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 2-2 6 2 6 2 2-2 4 4 0 0 0 0-4-4
 2 6-2 2-2 2 2 6-4-4 0 0 0 0 4 4
 6 2 2-2 2-2 6 2 0 0 4 4-4-4 0 0
-2 2 2 6 2 6-2 2 0 0-4-4 4 4 0 0
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-4-4 0 0 0 0 4 4-2-6 2-2 2-2-2-6
 4 4 0 0 0 0-4-4 2-2 6 2 6 2 2-2
-4-4 0 0 0 0 4 4 2 6-2 2-2 2 2 6
 0 0 4 4-4-4 0 0 6 2 2-2 2-2 6 2
 0 0-4-4 4 4 0 0-2 2 2 6 2 6-2 2
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 0 0-4-4 4 4 0 0 2-2-2-6-2-6 2-2
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7

```
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 1-1 5 3 5 3 1-1 1-1 5 3-3-5 1-1
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 5 3 5 3 1-1 1-1 5 3-3-5 1-1 1-1
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-5-7-1-3-1-3 3 1 3 1-1-3-1-3 3 1
 1-1 1-1 5 3 5 3 1-1 1-1 5 3-3-5
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-1-3 3 1-5-7-1-3-1-3 3 1 3 1-1-3
-5-3 3 5-1 1-1 1-5-3-5-3-1 1-1 1
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```

8

```
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 0 0 0 0 0 0 0 0-4-4 4 4-4-4-4-4
```

9

```
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-1-1-3-3 1 1-5-5 1 1 3 3-1-1-3-3
 1 1-1-1 7 7 1 1-1-1 1 1 1 1-1-1
-1-1 1 1-7-7-1-1 1 1-1-1-1-1 1 1
 1 1 3 3-1-1-3-3-1-1 5 5 1 1 3 3
-1-1-3-3 1 1 3 3 1 1-5-5-1-1-3-3
 1 1-1-1-1-1 1 1 7 7 1 1 1 1-1-1
-1-1 1 1 1 1-1-1-7-7-1-1-1-1 1 1
 1 1 3 3-1-1-3-3-1-1-3-3 1 1-5-5
-1-1-3-3 1 1 3 3 1 1 3 3-1-1 5 5
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-1-1 1 1 1 1-1-1 1 1-1-1 7 7 1 1
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-1-1 5 5 1 1 3 3 1 1 3 3-1-1-3-3
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 7 7 1 1 1 1-1-1 1 1-1-1-1-1 1 1
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10

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-2-2 2 2-2-2 2 2 0 0 0 0-4-4-4-4
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 0 0 0 0 4 4 4 4-2-2 2 2-2-2 2 2
 0 0 0 0-4-4-4-4 2 2-2-2 2 2-2-2
 4 4 4 4 0 0 0 0 2 2-2-2 2 2-2-2
-4-4-4-4 0 0 0 0-2-2 2 2-2-2 2 2
-4-4-4-4 0 0 0 0 2 2-2-2 2 2-2-2
 4 4 4 4 0 0 0 0-2-2 2 2-2-2 2 2
 0 0 0 0-4-4-4-4-2-2 2 2-2-2 2 2
 0 0 0 0 4 4 4 4 2 2-2-2 2 2-2-2
```

11

```
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 3 3 1 1 3 3 1 1 3 3 1 1-1-1-3-3
 1 1-1-1 1 1-1-1 1 1-1-1-3-3-5-5
-1-1 1 1-1-1 1 1-1-1 1 1 3 3 5 5
-1-1-3-3 3 3 1 1 3 3 1 1 3 3 1 1
 1 1 3 3-3-3-1-1-3-3-1-1-3-3-1-1
 3 3 5 5-1-1 1 1-1-1 1 1-1-1 1 1
-3-3-5-5 1 1-1-1 1 1-1-1 1 1-1-1
 3 3 1 1-1-1-3-3 3 3 1 1 3 3 1 1
-3-3-1-1 1 1 3 3-3-3-1-1-3-3-1-1
-1-1 1 1 3 3 5 5-1-1 1 1-1-1 1 1
 1 1-1-1-3-3-5-5 1 1-1-1 1 1-1-1
-3-3-1-1-3-3-1-1 1 1 3 3-3-3-1-1
 3 3 1 1 3 3 1 1-1-1-3-3 3 3 1 1
 1 1-1-1 1 1-1-1-3-3-5-5 1 1-1-1
-1-1 1 1-1-1 1 1 3 3 5 5-1-1 1 1
```

12

```
-2-2-2-2-2-2-2-2-2-2-2-2 2 2 2 2
 2 2 2 2 2 2 2 2 2 2 2 2-2-2-2-2
 2 2 2 2 2 2 2 2 2 2 2 2-2-2-2-2
-2-2-2-2-2-2-2-2-2-2-2-2 2 2 2 2
-2-2-2-2-2-2-2-2 2 2 2 2-2-2-2-2
 2 2 2 2 2 2 2 2-2-2-2-2 2 2 2 2
 2 2 2 2 2 2 2 2-2-2-2-2 2 2 2 2
-2-2-2-2-2-2-2-2 2 2 2 2-2-2-2-2
-2-2-2-2 2 2 2 2-2-2-2-2-2-2-2-2
 2 2 2 2-2-2-2-2 2 2 2 2 2 2 2 2
 2 2 2 2-2-2-2-2 2 2 2 2 2 2 2 2
-2-2-2-2 2 2 2 2-2-2-2-2-2-2-2-2
 2 2 2 2-2-2-2-2-2-2-2-2-2-2-2-2
-2-2-2-2 2 2 2 2 2 2 2 2 2 2 2 2
-2-2-2-2 2 2 2 2 2 2 2 2 2 2 2 2
 2 2 2 2-2-2-2-2-2-2-2-2-2-2-2-2
```

13

```
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 3 3 3 3 1 1 1 1 1 1 1 1-1-1-1-1
 3 3 3 3 1 1 1 1 1 1 1 1-1-1-1-1
-3-3-3-3-1-1-1-1-1-1-1-1 1 1 1 1
 1 1 1 1-1-1-1-1-1-1-1-1-3-3-3-3
-1-1-1-1 1 1 1 1 1 1 1 1 3 3 3 3
-1-1-1-1 1 1 1 1 1 1 1 1 3 3 3 3
 1 1 1 1-1-1-1-1-1-1-1-1-3-3-3-3
 1 1 1 1-1-1-1-1 3 3 3 3 1 1 1 1
-1-1-1-1 1 1 1 1-3-3-3-3-1-1-1-1
-1-1-1-1 1 1 1 1-3-3-3-3-1-1-1-1
 1 1 1 1-1-1-1-1 3 3 3 3 1 1 1 1
 1 1 1 1 3 3 3 3-1-1-1-1 1 1 1 1
-1-1-1-1-3-3-3-3 1 1 1 1-1-1-1-1
-1-1-1-1-3-3-3-3 1 1 1 1-1-1-1-1
 1 1 1 1 3 3 3 3-1-1-1-1 1 1 1 1
```

14

```
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2
```

15

```
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-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
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 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
```

code=1570$_H$

0

```
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0 0 0 X 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 X 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 X 0 0 0 0 0 0 0 0 0 0
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0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X
```

1

```
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 3 5 5-5 1 7-1 1-3 3-5-3-1 1 1 7
 7 5-7 3 5-1 3 1 1-5-1-3 3 1 5-1
-5 5-3 3 1-1-1 1 5 3 3 5-1-7 1 7
 7-3 1-5-3-1 3 1 1 3 7 5-5 1 5-1
-1 1 1 7-3 3-5-3 1 7-1 1 3 5 5-5
 3 1 5-1 1-5-1-3 5-1 3 1 7 5-7 3
-1 1 1-1 5-5 3-3 1 7-1-7-5-3-3-5
 3 1-3-1-7 3-1 5 5-1-5 1-1-3-7-5
 3-3 5 3 1-1-1-7-3-5-5 5-1-7 1-1
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-5-3-3-5 1 7-1-7 5-5 3-3-1 1 1-1
-1-3-7-5 5-1-5 1-7 3-1 5 3 1-3-1
-1-7 1-1-3-5-5 5 1-1-1-7 3-3 5 3
-5 1-3-1-7-5 7-3-3-1-5 1-1 5 1 3
```

2

```
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 2 2 6-2-2 6-6-6 4 0 4 0 4 0 4 0
-2-2 2-6-6 2 6 6 0 4 0 4 0 4 0 4
-6-6-2 6 6-2 2 2 4 0 4 0 4 0 4 0
-2 6 2 2-6-6 6-2 0-4 0-4 0-4 0-4
 2-6 6 6-2-2-6 2-4 0-4 0-4 0-4 0
 6-2-6-6 2 2-2 6 0-4 0-4 0-4 0-4
-6 2-2-2 6 6 2-6-4 0-4 0-4 0-4 0
 0 4 0 4 0 4 0 4 6 6-6 2 2-6-2-2
 4 0 4 0 4 0 4 0 2 2 6-2-2 6-6-6
 0 4 0 4 0 4 0 4-2-2 2-6-6 2 6 6
 4 0 4 0 4 0 4 0-6-6-2 6 6-2 2 2
 0-4 0-4 0-4 0-4-2 6 2 2-6-6 6-2
-4 0-4 0-4 0-4 0 2-6 6 6-2-2-6 2
 0-4 0-4 0-4 0-4 6-2-6-6 2 2-2 6
-4 0-4 0-4 0-4 0-6 2-2-2 6 6 2-6
```

3

```
-7-1-5 5 1-1 3 5-3-5-1 1 1-1-5-3
 1-5 3-7 1 3 3 1-3-1-1-3-7-5 3 1
 1-1 3-3-7-1-5-3-3 3-1 1 1 7-5-3
 1 3-5 1 1-5-5-7 5-1-1-3 1-5 3 1
-1 1 5 3 3 5 1-1-1 1-3-5 7 1 5-5
 7 5-3-1 3 1 1 3-1-3-3-1-1 5-3 7
-1-7 5 3 3-3 1-1 7 1 5 3-1 1-3 3
-1 5-3-1-5 1 1 3-1 5 5 7-1-3 5-1
 3 5 1-1-1 1 5 3 7 1 5-5-1 1-3-5
 3 1 1 3 7 5-3-1-1 5-3 7-1-3-3-1
 3-3 1-1-1-7 5 3-1 1-3 3 7 1 5 3
-5 1 1 3-1 5-3-1-1-3 5-1-1 5 5 7
 1-1 3 5-7-1-5 5 1-1-5-3-3-5-1 1
 1 3 3 1 1-5 3-7-7-5 3 1-3-1-1-3
-7-1-5-3 1-1 3-3 1 7-5-3-3 3-1 1
 1-5-5-7 1 3-5 1 1-5 3 1 5-1-1-3
```

4

```
 2 6-2 2 2-2-2-6 2-2 6 2 6 2 2-2
 2-2 6 2-6-2-2 2 2 6-2 2-2 2 2 6
 2-2-2-6 2 6-2 2-6-2-2 2-2 2-6-2
-6-2-2 2 2-2 6 2 2-2-2-6-2-6 2-2
 2-2-2-6 2 6-2 2 6 2 2-2 2-2 6 2
-6-2-2 2 2-2 6 2-2 2 2 6 2 6-2 2
 2 6-2 2 2-2-2-6-2 2-6-2-6-2-2 2
 2-2 6 2-6-2-2 2-2-6 2-2 2-2-2-6
 2-2 6 2 6 2 2-2 2 6-2 2 2-2-2-6
 2 6-2 2-2 2 2 6 2-2 6 2-6-2-2 2
-6-2-2 2-2 2-6-2 2-2-2-6 2 6-2 2
 2-2-2-6-2-6 2-2-6-2-2 2 2-2 6 2
 6 2 2-2 2-2 6 2 2-2-2-6 2 6-2 2
-2 2 2 6 2 6-2 2-6-2-2 2 2-2 6 2
-2 2-6-2-6-2-2 2 2 6-2 2 2-2-2-6
-2-6 2-2 2-2-2-6 2-2 6 2-6-2-2 2
```

5

```
-5-3-1 1 5 3 1-1-3-5 1-1-1-7 3-3
 3 1-1-3-3-1 1 3-3-1-7-5-1 5-5 1
 1-1 1-1-1 1-1 1-1 1 7 9-3 3-3 3
 1 3 1 3-1-3-1-3 7 5-1-3 5-1 5-1
-1-7 3-3-3-5 1-1 5 3 1-1-5-3-1 1
-1 5-5 1-3-1-7-5-3-1 1 3 3 1-1-3
-3 3-3 3-1 1 7 9-1 1-1 1 1-1 1-1
 5-1 5-1 7 5-1-3-1-3-1-3 1 3 1 3
 3 5-1 1 1 7-3 3 5 3 1-1-5-3-1 1
 3 1 7 5 1-5 5-1-3-1 1 3 3 1-1-3
 1-1-7-9 3-3 3-3-1 1-1 1 1-1 1-1
-7-5 1 3-5 1-5 1-1-3-1-3 1 3 1 3
-5-3-1 1 5 3 1-1 1 7-3 3 3 5-1 1
 3 1-1-3-3-1 1 3 1-5 5-1 3 1 7 5
 1-1 1-1-1 1-1 1 3-3 3-3 1-1-7-9
 1 3 1 3-1-3-1-3-5 1-5 1-7-5 1 3
```

6

```
 2 2 2 2-2-2-2-2 4 0 4 0 0-4 8 4
-2-2-2-2 2 2 2 2 0 4 0 4 4 8-4 0
 2 2 2 2-2-2-2-2-8-4 0 4-4 0-4 0
-2-2-2-2 2 2 2 2 4 0-4-8 0-4 0-4
 2 2 2 2-2-2-2-2 0 4-8-4-4 0-4 0
-2-2-2-2 2 2 2 2-4-8 4 0 0-4 0-4
 2 2 2 2-2-2-2-2 4 0 4 0 8 4 0-4
-2-2-2-2 2 2 2 2 0 4 0 4-4 0 4 8
 4 0 4 0 0-4 8 4 2 2 2 2-2-2-2-2
 0 4 0 4 4 8-4 0-2-2-2-2 2 2 2 2
-8-4 0 4-4 0-4 0 2 2 2 2-2-2-2-2
 4 0-4-8 0-4 0-4-2-2-2-2 2 2 2 2
 0 4-8-4-4 0-4 0 2 2 2 2-2-2-2-2
-4-8 4 0 0-4 0-4-2-2-2-2 2 2 2 2
 4 0 4 0 8 4 0-4 2 2 2 2-2-2-2-2
 0 4 0 4-4 0 4 8-2-2-2-2 2 2 2 2
```

7

```
-1-3 3 1-1-3 3 1-1-3-5-7-1-3 3 1
-1 1-5-3-1 1-5-3-1 1 3 5-1 1-5-3
 1 3 1 3 1 3 1 3-7-5 1 3 1 3 1 3
 1-1 1-1 1-1 1-1 9 7 1-1 1-1 1-1
 1 3-3-1 1 3 5 7 1 3-3-1 1 3-3-1
 1-1 5 3 1-1-3-5 1-1 5 3 1-1 5 3
-1-3-1-3 7 5-1-3-1-3-1-3-1-3-1-3
-1 1-1 1-9-7-1 1-1 1-1 1-1 1-1 1
 1 3 5 7 1 3-3-1 1 3-3-1 1 3-3-1
 1-1-3-5 1-1 5 3 1-1 5 3 1-1 5 3
 7 5-1-3-1-3-1-3-1-3-1-3-1-3-1-3
-9-7-1 1-1 1-1 1-1 1-1 1-1 1-1 1
-1-3 3 1-1-3 3 1-1-3 3 1-1-3-5-7
-1 1-5-3-1 1-5-3-1 1-5-3-1 1 3 5
 1 3 1 3 1 3 1 3 1 3 1 3-7-5 1 3
 1-1 1-1 1-1 1-1 1-1 1-1 9 7 1-1
```

8

```
 0 0 0 0 0 0 0 0 4 4-4-4 4 4 4 4
 0 0 0 0 0 0 0 0-4-4 4 4-4-4-4-4
 0 0 0 0 0 0 0 0-4-4 4 4 4 4 4 4
 0 0 0 0 0 0 0 0 4 4-4-4-4-4-4-4
 0 0 0 0 0 0 0 0 4 4 4 4 4 4-4-4
 0 0 0 0 0 0 0 0-4-4-4-4-4-4 4 4
 0 0 0 0 0 0 0 0 4 4 4 4-4-4 4 4
 0 0 0 0 0 0 0 0-4-4-4-4 4 4-4-4
 4 4-4-4 4 4 4 4 4 0 0 0 0 0 0 0 0
-4-4 4 4-4-4-4-4-4 0 0 0 0 0 0 0 0
-4-4 4 4 4 4 4 4 4 0 0 0 0 0 0 0 0
 4 4-4-4-4-4-4-4-4 0 0 0 0 0 0 0 0
 4 4 4 4 4 4-4-4-4 0 0 0 0 0 0 0 0
-4-4-4-4-4-4 4 4 0 0 0 0 0 0 0 0
 4 4 4 4-4-4 4 4 0 0 0 0 0 0 0 0
-4-4-4-4 4 4-4-4 0 0 0 0 0 0 0 0
```

9

```
-3-3-5-5-1-1 1 1 3 3-3-3 1 1-1-1
 3 3 5 5 1 1-1-1-3-3 3 3-1-1 1 1
-3-3-1-1-1-1-3-3-5-5 1 1 1 1 3 3
 3 3 1 1 1 1 3 3 5 5-1-1-1-1-3-3
 1 1-1-1 3 3-3-3-1-1 1 1-3-3-5-5
-1-1 1 1-3-3 3 3 1 1-1-1 3 3 5 5
 1 1 3 3-5-5 1 1-1-1-3-3-3-3-1-1
-1-1-3-3 5 5-1-1 1 1 3 3 3 3 1 1
-3-3 3 3-1-1 1 1 3 3 5 5 1 1-1-1
 3 3-3-3 1 1-1-1-3-3-5-5-1-1 1 1
 5 5-1-1-1-1-3-3 3 3 1 1 1 1 3 3
-5-5 1 1 1 1 3 3-3-3-1-1-1-1-3-3
 1 1-1-1 3 3 5 5-1-1 1 1-3-3 3 3
-1-1 1 1-3-3-5-5 1 1-1-1 3 3-3-3
 1 1 3 3 3 3 1 1-1-1-3-3 5 5-1-1
-1-1-3-3-3-3-1-1 1 1 3 3-5-5 1 1
```

10

```
-2-2-2-2-2-2-2-2 4 4 0 0 0 0-4-4
 2 2 2 2 2 2 2 2-4-4 0 0 0 0 4 4
-2-2-2-2-2-2-2-2-4-4 0 0 0 0 4 4
 2 2 2 2 2 2 2 2 4 4 0 0 0 0-4-4
 2 2 2 2 2 2 2 2 0 0 4 4-4-4 0 0
-2-2-2-2-2-2-2-2 0 0-4-4 4 4 0 0
 2 2 2 2 2 2 2 2 0 0-4-4 4 4 0 0
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 4 4 0 0 0 0-4-4-2-2-2-2-2-2-2-2
-4-4 0 0 0 0 4 4 2 2 2 2 2 2 2 2
-4-4 0 0 0 0 4 4-2-2-2-2-2-2-2-2
 4 4 0 0 0 0-4-4 2 2 2 2 2 2 2 2
 0 0 4 4-4-4 0 0 2 2 2 2 2 2 2 2
 0 0-4-4 4 4 0 0-2-2-2-2-2-2-2-2
 0 0-4-4 4 4 0 0 2 2 2 2 2 2 2 2
 0 0 4 4-4-4 0 0-2-2-2-2-2-2-2-2
```

11

```
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-1-1 1 1-1-1 1 1-1-1 1 1 3 3 5 5
-3-3-1-1-3-3-1-1-3-3-1-1 1 1 3 3
 3 3 1 1 3 3 1 1 3 3 1 1-1-1-3-3
 3 3 5 5-1-1 1 1-1-1 1 1-1-1 1 1
-3-3-5-5 1 1-1-1 1 1-1-1 1 1-1-1
-1-1-3-3 3 3 1 1 3 3 1 1 3 3 1 1
 1 1 3 3-3-3-1-1-3-3-1-1-3-3-1-1
-1-1 1 1 3 3 5 5-1-1 1 1-1-1 1 1
 1 1-1-1-3-3-5-5 1 1-1-1 1 1-1-1
 3 3 1 1-1-1-3-3 3 3 1 1 3 3 1 1
-3-3-1-1 1 1 3 3-3-3-1-1-3-3-1-1
 1 1-1-1 1 1-1-1-3-3-5-5 1 1-1-1
-3-3-1-1-3-3-1-1 1 1 3 3-3-3-1-1
 3 3 1 1 3 3 1 1-1-1-3-3 3 3 1 1
```

```
                12                                  13
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-2-2-2-2-2-2-2-2-2-2-2-2-2 2 2 2 2   -3-3-3-3-1-1-1-1-1-1-1-1 1 1 1 1
-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2 2   -3-3-3-3-1-1-1-1-1-1-1-1-1 1 1 1 1
 2 2 2 2 2 2 2 2 2 2 2 2 2-2-2-2-2    3 3 3 3 1 1 1 1 1 1 1 1-1-1-1-1
 2 2 2 2 2 2 2 2 2-2-2-2-2 2 2 2 2   -1-1-1-1 1 1 1 1 1 1 1 1 3 3 3 3
-2-2-2-2-2-2-2-2-2 2 2 2 2-2-2-2-2    1 1 1 1-1-1-1-1-1-1-1-1-3-3-3-3
-2-2-2-2-2-2-2-2-2 2 2 2 2-2-2-2-2    1 1 1 1-1-1-1-1-1-1-1-1-3-3-3-3
 2 2 2 2 2 2 2 2-2-2-2-2 2 2 2 2 2   -1-1-1-1 1 1 1 1 1 1 1 1 3 3 3 3
 2 2 2 2-2-2-2-2 2 2 2 2 2 2 2 2 2   -1-1-1-1 1 1 1 1-3-3-3-3-1-1-1-1
-2-2-2-2 2 2 2 2-2-2-2-2-2-2-2-2-2    1 1 1 1-1-1-1-1 3 3 3 3 1 1 1 1
-2-2-2-2 2 2 2 2-2-2-2-2-2-2-2-2-2    1 1 1 1-1-1-1-1 3 3 3 3 1 1 1 1
 2 2 2 2-2-2-2-2 2 2 2 2 2 2 2 2 2   -1-1-1-1 1 1 1 1-3-3-3-3-1-1-1-1
-2-2-2-2 2 2 2 2 2 2 2 2 2 2 2 2 2   -1-1-1-1-3-3-3-3 1 1 1 1-1-1-1-1
 2 2 2 2-2-2-2-2-2-2-2-2-2-2-2-2-2    1 1 1 1 3 3 3 3-1-1-1-1 1 1 1 1
 2 2 2 2-2-2-2-2-2-2-2-2-2-2-2-2-2    1 1 1 1 3 3 3 3-1-1-1-1 1 1 1 1
-2-2-2-2 2 2 2 2 2 2 2 2 2 2 2 2 2   -1-1-1-1-3-3-3-3 1 1 1 1-1-1-1-1

                14                                  15
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-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
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 0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2   -1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
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0 X 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   -1-3 1 3 5 7 3 1 1-5-1 5-5 1-3 7
0 0 X 0 0 0 0 0 0 0 0 0 0 0 0 0 0    3 5-3 3 1-1 7 1 5-5-5-3 7 1 1-1
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0 0 0 0 0 0 X 0 0 0 0 0 0 0 0 0 0    7 1 1-1 5-5-5-3 1-1 7 1 3 5-3 3
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0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X 0   -1-3 1-5-3-1-5 1 1-5-1-3 3-7 5 7
```

2

```
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 4-4 4 4-4-4-4 4 6 2 2-2 2-2 6 2
 4-4-4-4 4 4-4 4-2 2 2 6 2 6-2 2
-4 4-4-4 4 4 4-4 6 2 2-2 2-2 6 2
 4 4-4 4 4-4-4-4-2-6 2-2 2-2-2-6
 4 4 4-4-4 4-4-4-2 2-6-2-6-2-2 2
-4-4 4-4-4 4 4 4-2-6 2-2 2-2-2-6
-4-4-4 4 4-4 4 4-2 2-6-2-6-2-2 2
-2 2 2 6 2 6-2 2-4 4 4 4-4-4 4-4
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 6 2 2-2 2-2 6 2-4 4-4-4 4 4 4-4
-2-6 2-2 2-2-2-6 4 4-4 4 4-4-4-4
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3

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 1 7-5-3-3 3-1 1-7-1-5-3 1-1 3-3
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-1-3 5-1-1 5 5 7-5 1 1 3-1 5-3-1
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-1 5-3 7-1-3-3-1 3 1 1 3 7 5-3-1
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 5-1-1-3 1-5 3 1 1 3-5 1 1-5-5-7
-3 3-1 1 1 7-5-3 1-1 3-3-7-1-5-3
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4

```
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 2 6-2 2-2-6 2-2-2 2-6-2-2 2-6-2
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5

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 1-1-3-5-1 1 3 5-1 1-5-3-3 3-7-1
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 1-1-3-5-1 1 3 5 3-3 7 1 1-1 5 3
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 3 1 3 1-3-1-3-1 1-5 1-5 3 1-5-7
 1-1 5 3 3-3 7 1-1 1 3 5 1-1-3-5
 5 7 1 3-1 5-5 1 3 1-1-3-3-1 1 3
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 3 1-5-7 1-5 1-5-3-1-3-1 3 1 3 1
```

6

```
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 0 0 0 0 4 4-4-4-2 2-2 2 2 6 2 6
 0 0 0 0 4 4-4-4 6 2 6 2 2-2 2-2
 0 0 0 0-4-4 4 4-2 2-2 2 2 6 2 6
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-2-6-2-6 2-2 2-2 4 4-4-4 0 0 0 0
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 6 2 6 2 2-2 2-2 0 0 0 0 4 4-4-4
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```

7

```
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-5-7-1-3-1-3 3 1 3 1-1-3-1-3 3 1
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-1-3-1-3 3 1-5-7-1-3-1-3 3 1 3 1
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 1 3-3-1-3-1 1 3 1 3-3-1 5 7 1 3
-5-3 3 5-1 1-1 1-5-3-5-3-1 1-1 1
 3 1-5-7-1-3-1-3 3 1 3 1-1-3-1-3
 5 3 1-1 1-1 5 3-3-5 1-1 1-1 5 3
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 1-1 1-1 5 3 5 3 1-1 1-1 5 3-3-5
 1 3 1 3-3-1-3-1 1 3 1 3-3-1 5 7
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-1-3 3 1-5-7-1-3-1-3 3 1 3 1-1-3
```

8

```
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9

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-3-3-1-1 3 3 1 1-5-5 1 1-3-3-1-1
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 1 1-1-1-1-1-7-7-1-1 1 1 1 1-1-1
 3 3 1 1 5 5-1-1-3-3-1-1 3 3 1 1
-3-3-1-1-5-5 1 1 3 3 1 1-3-3-1-1
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 1 1 7 7-1-1 1 1-1-1 1 1 1 1-1-1
-5-5 1 1-3-3-1-1-3-3-1-1 3 3 1 1
 5 5-1-1 3 3 1 1 3 3 1 1-3-3-1-1
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```

10

```
 0 0 4 4-4-4 0 0-2-2-2-2-2-2-2-2
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 0 0-4-4 4 4 0 0-2-2-2-2-2-2-2-2
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 4 4 0 0 0 0-4-4 2 2 2 2 2 2 2 2
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```

11

```
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-3-3-1-1-3-3-1-1 1 1 3 3-3-3-1-1
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 1 1-1-1-3-3-5-5 1 1-1-1 1 1-1-1
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 1 1 3 3-3-3-1-1-3-3-1-1-3-3-1-1
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-3-3-5-5 1 1-1-1 1 1-1-1 1 1-1-1
 3 3 5 5-1-1 1 1-1-1 1 1-1-1 1 1
 3 3 1 1 3 3 1 1 3 3 1 1-1-1-3-3
-3-3-1-1-3-3-1-1-3-3-1-1 1 1 3 3
-1-1 1 1-1-1 1 1-1-1 1 1 3 3 5 5
 1 1-1-1 1 1-1-1 1 1-1-1-3-3-5-5
```

12

```
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 2 2 2 2-2-2-2-2-2-2-2-2-2-2-2-2
 2 2 2 2-2-2-2-2-2-2-2-2-2-2-2-2
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 2 2 2 2 2 2 2 2 2 2 2 2 2-2-2-2
```

13

```
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```

14	15
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0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2	-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2	-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0 0 0 0 0 0 0 0-2-2-2-2-2-2-2-2	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0 0 0 0 0 0 0 0 2 2 2 2 2 2 2 2	-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
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2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
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2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0	-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
-2-2-2-2-2-2-2-2 0 0 0 0 0 0 0 0	-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
2 2 2 2 2 2 2 2 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1