

# Number Magic

A simple magic trick for guessing a volunteer's number uses some specially prepared cards with numbers on them. Each card has a set of numbers. The volunteer secretly chooses a number from a given range, then examines each of the cards in the set. The volunteer then hands the cards that contain the chosen number to the magician. The magician holds the cards to her head and pronounces the volunteer's secret number.

The trick uses binary arithmetic to aid the magician. There is one card for each bit in the binary representation of the numbers. The number of cards required is determined by the number of bits necessary to represent the largest number. Each card only contains numbers in the given range that have the card's particular bit set in their binary representation. The magician just adds up the value of the bits that are set in the volunteer's numbers as the cards are handed to her.

For example, if the numbers are in the range 1-7, there will be 3 cards, because the largest number, 7, requires the 1, 2 and 4 bits to all be set. The first card will contain the numbers that require the 1 bit to be set in their representation: 1, 3, 5, and 7. The second card will contain the numbers that require the 2 bit to be set in their representation: 2, 3, 6, and 7. The third card will contain the numbers that require the 4 bit to be set in their representation: 4, 5, 6, and 7.

Your program will be required to make cards for a specified range of numbers. It will need to calculate the number of cards needed, and the numbers to be displayed on each card.

The input file will contain one line. The line will contain two numbers, N and M. N is the lowest number in the range, and M is the largest number in the range. The numbers will obey the constraints  $0 < N < M < 2,000,000,000$  and  $M - N < 8192$ .

The output file will contain a line with the number of cards to produce, followed by a line for each card. Each card line will contain a list of the numbers that will appear on the card. The numbers will be ordered from smallest to largest, and separated by a single space. The last number on the line may be followed by a space, but the space is not required.

## Examples

input.txt

1 7\$

output.txt

3\$

1 3 5 7\$

2 3 6 7\$

4 5 6 7\$

input.txt

7 18\$

output.txt

5 \$

7 9 11 13 15 17\$

7 10 11 14 15 18\$

7 12 13 14 15\$

8 9 10 11 12 13 14 15\$

16 17 18\$