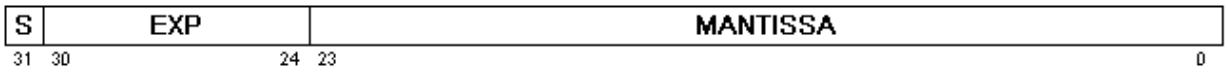
C • Floating-Point Format Conversion

To help support a patent defense, we need to recover some experimental data that was stored as single precision floating point on a now-defunct Gould Power-Node mini-computer. The Gould used a base 16 floating-point format. We want to convert Gould floating point values, as much as possible, to single precision *IEEE* floating-point values.

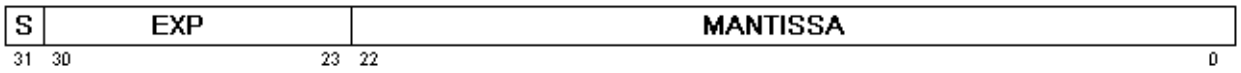
The Gould internal floating-point format has 1 sign bit, **S**, a 7-bit offset (base 16) exponent field, **E**, and a 24-bit (6 hex digits) hexadecimal mantissa. (Note that this means that up to 3 high bits of the mantissa may be zero.)



$$\text{value} = ((-1)^{S})((16)^{(EXP-64)})(MANTISSA / (2^{24}))$$

Floating-point zero is represented by 32 bits of 0.

The *IEEE* format has 1 sign bit, **S**, an 8-bit offset (base 2) exponent field, **E**, and a 24-bit mantissa, for which the high bit is (in normalized numbers) always 1 and not part of the 23 bits in the format.



If the exponent is not 255 and not 0, the value is a normalized floating point number,

$$\text{value} = ((-1)^{S})((2)^{(EXP-127)})(1 + (MANTISSA / (2^{23})))$$

If the exponent is 255 and the mantissa is 0, the value is plus or minus **infinity** (depending on the sign bit). If the exponent is 255 and the mantissa is not 0, it indicates special values that will not be used in this problem.

If the exponent is 0 and the mantissa is zero, the value is plus or minus zero (depending on the sign bit).

If the exponent is 0 and the mantissa is not zero, the value is a de-normalized floating-point number with:

$$\text{value} = ((-1)^{S})((2)^{(-126)})(MANTISSA / (2^{23}))$$

Write a program that takes as input a floating-point value in Gould format and outputs the value in IEEE format as follows:

If the value is zero return (plus) zero.

If the value is too large to be represented as a normalized floating-point value, return plus or minus infinity depending on the sign.

If the value is too small to be represented as a normalized floating-point value:
    If it may be represented as a de-normalized value, return the de-normalized value.
    Otherwise, return plus or minus zero, depending on the sign.

In all other cases, return the normalized value.

If there are less significant bits than required for IEEE floating-point, extend with 0 bits.

If there are more significant bits than required for IEEE floating-point, truncate the extra bits.

Input

The first line of input contains a single integer P, ($1 \le P \le 1000$), which is the number of data sets that follow. Each data set should be processed identically and independently.

Each data set consists of a single line of input. It contains the data set number, K, followed by 8 hex digits (`0-9,A-F`) of the Gould floating-point value.

Output

For each data set there is one line of output. The single output line consists of the data set number, K, followed by a single space followed by the 8 hex digits (`0-9,A-F`) of the corresponding (as described above) *IEEE* floating point value.

Sample Input	Sample Output
4 1 41200000 2 E0FFFFFE 3 E11FFFFF 4 88888888	1 40000000 2 FF7FFFFE 3 FF800000 4 80000000