You are participating in a TV competition where your goal is to build a sequence whose last element is a given natural number $n$. You can reach it sticking to the following rules:

1. $x\_{0}=1$.
2. $x\_{i}=x\_{j} @ x\_{k}$ for each $i\geq 1$, $0\leq j, k<i$ and $@$ is any of the following operations, each of which has a unique code:

|  |  |
| --- | --- |
| **Code** | **Operation** |
| $$1$$ | $x\_{i}=x\_{j}+x\_{k}$, addition |
| $$2$$ | $x\_{i}=x\_{j}-x\_{k}$, subtraction |
| $$3$$ | $x\_{i}=x\_{j}\*x\_{k}$, multiplication |
| $$4$$ | $x\_{i}=x\_{j}/x\_{k}$, integer division |
| $$5$$ | $x\_{i}=x\_{j}\%x\_{k}$, remainder of division |
| $$6$$ | $x\_{i}=x\_{j}\&x\_{k}$, bitwise "and" |
| $$7$$ | $x\_{i}=x\_{j}|x\_{k}$, bitwise "or" |
| $$8$$ | $x\_{i}=x\_{j}\^x\_{k}$, bitwise exclusive "or" |

**The constraint** $1\leq x\_{i}<2^{63}$ **must be fulfilled during the whole time.**

The application of an operation is denoted by $(operation code) (j) (k)$. The goal is to find a sequence of operations for which $x\_{l}=n$ and $l$ is as small as possible.

Answer $t$ such queries.

**Input**

The first line of the file **competition.in** contains the number$ t$. Each of the next $t$ lines contains one number - $n$ for the corresponding query.

**Output**

For each query, print in the file **competition.out** first the number of operations $l$ ($0\leq l\leq 150$), and on the next $l$ lines - the operations themselves. $x\_{l}=n$ must be satisfied. **If for some** $n$ **you cannot find the required operations, print** $-1$**.**

**Constraints**

$$2\leq n<2^{63}$$

$$1\leq t\leq 1000$$

**It is guaranteed that for every** $n<2^{63}$ **there is a solution with at most 150 operations.**

 **Time limit: 5 sec.**

 **Memory limit: 256 MB.**

**Scoring**

For each solved query $l^{2}$ will be added to your score, and for each $–1: 300^{2}$. For each test, let *minScore* be the smallest score among all participants' scores and *yourScore* be your score. You will be awarded $1-\sqrt{1-\frac{minScore+1}{yourScore+1}}$ multiplied by the amount of points for the test.

The tests are distributed as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| $$n$$$$t$$ | $$<2^{15}$$ | $$<2^{31}$$ | $$<2^{63}$$ |
| $$=10^{1}$$ | $$5\%$$ | $$5\%$$ | $$5\%$$ |
| $$=10^{2}$$ | $$5\%$$ | $$15\%$$ | $$15\%$$ |
| $$=10^{3}$$ | $$5\%$$ | $$15\%$$ | $$30\%$$ |

**Tests generation**

The numbers $n$ are randomly generated in the respective intervals that bound them (each number in the interval has an equal chance). It is guaranteed that they are distinct.

**Sample test**

|  |  |
| --- | --- |
| **Input (competition.in)** | **Output (competition.out)** |
| 232123456789012345678 | 101 0 01 1 01 2 08 2 33 4 44 5 17 6 55 7 62 5 86 9 5-1 |

**Example explanation**

For$n=32$*,* $x\_{0}=1$

$$x\_{1}=x\_{0}+x\_{0}=1+1=2$$

$$x\_{2}=x\_{1}+x\_{0}=2+1=3$$

$$x\_{3}=x\_{2}+x\_{0}=3+1=4$$

$$x\_{4}=x\_{2}\^x\_{3}=3\^4=7$$

$$x\_{5}=x\_{4}\*x\_{4}=7\*7=49$$

$$x\_{6}=x\_{5}/x\_{1}=49/2=24$$

$$x\_{7}=x\_{6}|x\_{5}=24|49=57$$

$$x\_{8}=x\_{7}\%x\_{6}=57\%24=9$$

$$x\_{9}=x\_{5}-x\_{8}=49-9=40$$

$$x\_{10}=x\_{9}\&x\_{5}=40\&49=32$$

No solution was found for $n=123456789012345678$ and $–1$is printed instead.

The total result is $10^{2}+300^{2}=100+90000=90100$