CMPUT 274 - Tangible Computing **Fall 2017**
Morning Problem: SOS

Description

A sum-of-squares (SOS) integer is an integer that can be written as the sum of the squares of precisely two integers. For example, $n = 5$ is a SOS integer because $5 = 1^2 + 2^2$. Even 1 is a SOS integer because $1 = 0^2 + 1^2$.

But 7 is not a SOS integer, you can see that adding any two integers of the form 0^2, 1^2, or 2^2 will not give you 7. Notice we did not have to try 3^2, 4^2, or anything larger because these squares already exceed 7.

Given an integer, tell me if it is an SOS integer.

A Potentially Helpful Function

We have included a function to compute square roots of integers (rounded down):

unsigned int integer_sqrt(unsigned int x);

This will return the greatest integer d such that $d*d \leq x$. In particular, if the parameter x is a perfect square (like 0, 1, 4, 9, 16, etc.) then it returns the square root of x. This is already in `soln/sos.cpp` from `sos.tar.gz` that you download from eClass. You may choose to use it or ignore it.

Input

Input consists of a single line containing a single integer n. Here, $0 \leq n \leq 4,000,000,000$.

Output

Output a single line consisting of the text **sum of squares** or **not sum of squares**, indicating the answer for n.

Sample Input 1

```
3
```

Sample Output 1

```
not sum of squares
```

Explanation: It is easy to check that 3 is not a SOS integer. If $3 = a^2 + b^2$ for some integers a, b, then $a, b < 2$ because $2^2 > 3$. But any choice of a and b being 0 or 1 does not equal 3.

Sample Input 2

```
29
```

Sample Output 2

```
sum of squares
```

Explanation: $29 = 2^2 + 5^2$

Sample Input 3

```
3999999999
```

Sample Output 3

```
not sum of squares
```

Explanation: You will have to take my word for it, or check it with your own program!

Sample Input 4

```
4000000000
```

Sample Output 4

```
sum of squares
```

Explanation: $4000000000 = 36000^2 + 52000^2$

Sample Input 5

```
0
```

Sample Output 5

```
sum of squares
```

Explanation: $0 = 0^2 + 0^2$