Happy numbers X16872_en

A positive natural number is *happy* if the sequence of natural numbers obtained by replacing the number by the sum of the squares of its digits contains the number 1. Otherwise, it is a *sad* number, and it can be proved that the sequence contains the number 4.
For example, 19 is a happy number, because:

- $1^2 + 9^2 = 82$
- $8^2 + 2^2 = 68$
- $6^2 + 8^2 = 100$
- $1^2 + 0^2 + 0^2 = 1$

On the other hand, 18 is a sad number, because:

- $1^2 + 8^2 = 65$
- $6^2 + 5^2 = 61$
- $6^2 + 1^2 = 37$
- $3^2 + 7^2 = 58$
- $5^2 + 8^2 = 89$
- $8^2 + 9^2 = 145$
- $1^2 + 4^2 + 5^2 = 42$
- $4^2 + 2^2 = 20$
- $2^2 + 0^2 = 4$

Write a program that indicates if several given natural numbers are happy or not.
Your program must include and use the function

```
bool is_happy(int n);
```

that indicates if a natural number n is happy or not.
Note: Recall that at this point of the course using vectors or any other method to store massive data is not allowed.
Exam score: 3 **Automatic part:** 40%

Input

The input is a non-empty sequence of positive natural numbers.

Output

For each natural number of the input, print if it is a happy number or it is not. Afterwards, print an empty line and the number of happy numbers and sad numbers read. Follow the format of the instance.

Sample input

```
1
2
3
4
5
6
7
8
9
10
```

Sample output

```
1 is a happy number
2 is a sad number
3 is a sad number
4 is a sad number
5 is a sad number
6 is a sad number
7 is a happy number
8 is a sad number
9 is a sad number
10 is a happy number

happy numbers: 3
sad numbers: 7
```

Problem information

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