DMOPC '18 Contest 3 P1 - Bob and Music Class

Time limit: 1.0s **Memory limit:** 64M

Bob is studying for his music theory exam and needs your help!

In music, there are 12 distinct **tones**. They are named, in ascending order, `A, A#, B, C, C#, D, D#, E, F, F#, G,` and `G#`. (Note that there is no `B#` or `E#`.) After `G#`, the sequence cycles back to `A` and repeats. The distance between two adjacent tones is one **semitone**.

The **interval** between two tones a and b is the distance in semitones from tone a to tone b. For example, the interval between `F` and `A#` is 5 semitones (`F -> F# -> G -> G# -> A -> A#` = 5 steps from `F` to `A#`) and the interval between `A#` and `F` is 7 semitones (`A# -> B -> C -> C# -> D -> D# -> E -> F`).

A **triad** is a certain kind of sequence of 3 tones (ex. `F#, A, C#`). There are 4 **types** of triads. If the intervals between the first and second tones and the second and third tones are 4 and 3 semitones respectively, the triad is **major** (ex. `C, E, G`). If they are 3 and 4, the triad is **minor** (ex. `C, D#, G`). If they are 4 and 4, the triad is **augmented** (ex. `C, E, G#`). If they are 3 and 3, the triad is **diminished** (ex. `C, D#, F#`).

Triads can come in 3 different **inversions**. A triad in **root position** follows one of the 4 interval patterns described above (ex. `E, G#, B`). A triad in **first inversion** has a cyclic shift of 1 to the left from its root position (ex. `G#, B, E`), and a triad in **second inversion** has a cyclic shift of 2 to the left from its root position (ex. `B, E, G#`).

The first tone of the triad when it is shifted to root position is known as its **root**. For example, the root of `G#, B, E` is `E` and the root of `C, D#, G` is `C`.

Given a triad, help Bob find its root, type, and inversion.

If the given triad is augmented, assume it is in root position.

Input Specification

3 lines with a valid tone on each line. The i-th line contains the i-th tone of the triad.

The triad represented by the tones is guaranteed to be a valid major, minor, augmented, or diminished triad in root position, first inversion, or second inversion.

Output Specification

Output the root of the triad, the type of the triad (`major`, `minor`, `augmented`, or `diminished`), and the inversion of the triad (`root position`, `first inversion`, or `second inversion`), each on its own line.

Note that the augmented triad is unique in that its first and second inversions can also be augmented triads in another root (for example, `C, E, G#` can be root-position with root `C` or first-inversion with root `G#`). **Thus, if the given triad is augmented, assume it is in root position.**

Sample Input 1

```
C
E
G
```

Sample Output 1

```
C
major
root position
```

Sample Input 2

```
A#
E
G
```

Sample Output 2

```
E
diminished
second inversion
```

Sample Input 3

```
F#
A#
D
```

Sample Output 3

```
F#
augmented
root position
```