Problem G : Mendel

inputfile: input.G
outputfile: output.G

Description

Two months ago one of the judges became father of a son. Before the child was born a lot of speculation was going on about its appearance. You should know that both parents have a Chinese father (dark hair, brown eyes) and a Dutch mother (blond hair, blue eyes). Although both parents have an Oriental look, there was a reasonable chance the baby would have blue eyes and blond hair. The final outcome was less surprising. The Oriental influences were clearly visible when the baby-boy was born. This is not his story. Some feared it would be politically incorrect. This one is about another planet.

On Koseb, a few light years away, live two kinds of beings: Jona and Nathan. Each kind has its own characteristics but the most striking difference is the colour of their left ear. A Jona-being has a green left ear, a Nathan-being has a purple left ear.
Both species lived separatedly for many years, but increasing global mobility has led to many mixed engagements. The first descendants always had a purple ear, but the colour of the left ear of their descendants couldn't be predicted again.

After long research scientists found out that each being has exactly two genes that determine the colour of the left ear. Only three combinations exist:

- pure: `Green Green` or `Purple Purple`
- mixed: `Green Purple` (is the same as `Purple Green`)

It appeared that Purple was dominant over Green, so someone with a mixed combination always has a purple left ear.
When two beings get a descendant, the descendant gets one single gene of each parent. This gene is randomly chosen. For example if one of the parent has a mixed combination (GP) and the other has a pure green combination (GG), then the descendant has an even chance to get a pure combination (GG), a green left ear, or a mixed combination (GP), a purple left ear.

When the beings on Koseb finally found out what caused the colour of their ears, they still couldn't predict colours, because the gene-combinations of the ancestors were unknown. Fortunately all the past engagements were well administrated, going back for many years, even to the time that there were no mixed engagements.

Problem

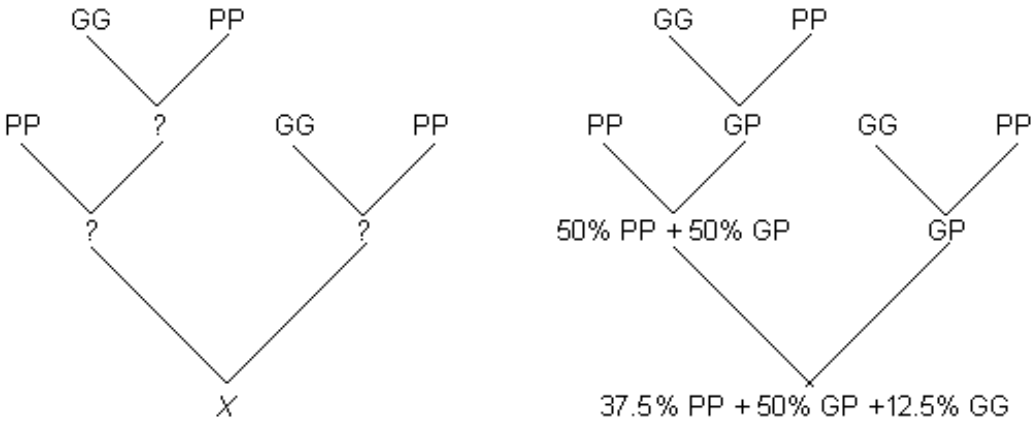
Build a program that calculates the chances for the colour of the left ear of a certain person if the family trees of both parents are known. The leaves of a family tree are always pure combinations.

Example

The chances for the being at *X* can be calculated as followed:

- The engagement between GG and PP results in a 100% GP combination.
- The engagement between PP and GP(100%) results in a GP(50%) or a PP(50%) combination.

- The GP(50%)+PP(50%) combination and the GP(100%) combination result in: PP(37,5%)+GP(50%)+GG(12,5%) combination.



So the being at *X* has a 87.5% chance to have a purple left ear and a 12.5% chance to have a green left ear.

Input

The inputfile start with a single line, which contains the number of testruns t in the file. A testrun consists of two lines. Each line indicating the family tree of one of the parents.
In the family tree the gene for a purple left ear is indicated with the character 'P' and the gene for a green left ear is indicated with the character 'G'.
In a family tree a being is defined by its genes or its two parents.

```
genes  :: PP | GG
being  :: genes | (parent-being,parent-being)
```

In the example the left family tree is defined as: (PP,(GG,PP)) and the right family tree is defined as (GG,PP).

Output

For each testrun from the input one single line has to be generated with the chance that the being has a purple left ear. The chance has to be given in percentages in one decimal precise.

Sample

Sample input

```
2
(PP,(GG,PP))
(GG,PP)
(PP,GG)
(GG,PP)
```

Correct output for the sample input

```
87.5
75.0
```