Problem 191: Discovering Planets

Difficulty: Easy

Author: Sowmya Chandrasekaran, Sunnyvale, California, United States

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Problem Background

A planet has been discovered by a group of astronomers! Now they must work to determine if the planet can support life. There are many determinants in arriving at a conclusion, including the presence of water, and reasonable temperature levels and climates. Astronomers can use decision trees to help inform their conclusions. Decision trees are flowchart-like structures that map out possible outcomes of a series of related actions. They are frequently used to arrive at a decision and allow the user to weigh possible actions and their consequences against one another based on their probabilities.

Problem Description

For a planet to be considered habitable, it must meet these conditions:

- Temperature: The advanced life that we know about depends upon water. As a result, one condition for the habitable zone is that water can exist in liquid form. This requires a temperature range between 0°C and 100°C.
- Presence of Water: Again, water is essential to life as we know it. Having a good temperature means little if there's no water on the planet. Astronomers can use advanced telescopes to identify the presence of water vapor in an atmosphere, or ice or water on the planet's surface.
- Survivable Surface: Earth's global magnetic field shields surface life from the lethal effects of charged particles in the solar wind and in cosmic rays. The presence of such a field is essential to a planet's ability to support life.
- Circular Orbits: A stretched-out, heavily elliptical orbit results a varying climate, which could prevent the evolution of complex organisms, and even the origin of life. A more stable and less elliptical orbit ensures more consistent conditions on the planet. This is represented by the orbit's eccentricity; an eccentricity of 0.0 indicates a perfectly circular orbit, whereas a value closer to 1.0 indicates a more elliptical orbit. An ideal orbit for a habitable planet would have an eccentricity less than 0.6.

Your team is working with the National Aeronautics and Space Agency (NASA) and the European Space Agency (ESA) to evaluate exoplanets for habitability. You'll be provided with information about each planet on each of the points above, and must construct a decision tree to determine if the planet is habitable or not; and if not, the primary reason why.

Sample Input

The first line of your program's input, **received from the standard input channel**, will contain a positive integer representing the number of test cases. Each test case will include a single line with the following values, separated by spaces:

- A decimal value representing the average estimated temperature on the planet's surface, in degrees Celsius (°C).
- A Boolean value indicating the presence (true) or absence (false) of water in some form.
- A Boolean value indicating the presence (true) or absence (false) of a planetary magnetic field.
- A decimal value, between 0.0 and 1.0 exclusive, representing the eccentricity of the planet's orbit.

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4
13.81 true true 0.0167
-12.51 true true 0.6124
53.4 false true 0.5116
23.1 true true 0.7234
```

Sample Output

For each test case, your program must print a single line containing a sentence as follows:

- If the planet has a temperature above 100°C, print "The planet is too hot."
- Otherwise, if the planet has a temperature below 0°C, print "The planet is too cold."
- Otherwise, if the planet does not contain water, print "The planet has no water."
- Otherwise, if the planet does not have a magnetic field, print "The planet has no magnetic field."
- Otherwise, if the planet's orbit has an eccentricity greater than 0.6, print "The planet's orbit is not ideal."
- Otherwise, print "The planet is habitable."

```
The planet is habitable.
The planet is too cold.
The planet has no water.
The planet's orbit is not ideal.
```