

Problem 7: Mars Vacation

Difficulty: Medium

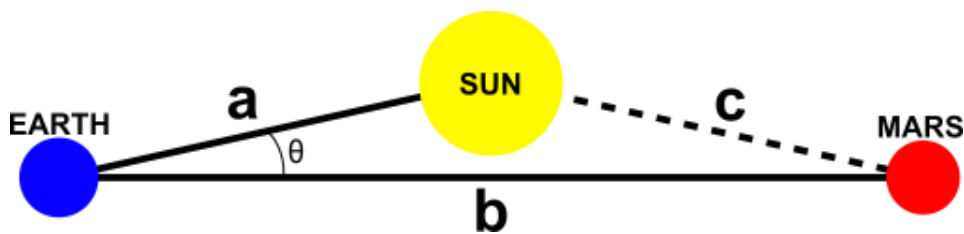
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Problem Background

Missions operating in orbit or on the surface of Mars require contact with the Earth to receive instructions and to transmit data. Lockheed Martin works with NASA to support some of these missions, including the Mars Reconnaissance Orbiter. Unfortunately, the Sun can make this difficult sometimes. Whenever the Sun is between Earth and Mars (called a “solar conjunction”), it obscures the communication link with those robots, giving them a well-earned vacation.

Problem Description

You'll be given two coordinates representing the positions of Earth and Mars. The Sun will be located at the origin; (0,0). Your team needs to write a program to determine whether the robots on Mars are getting a vacation, based on whether a solar conjunction is taking place. According to NASA, a solar conjunction occurs whenever the angle between a line from Earth to Mars and a line from Earth to the Sun is less than two degrees.



Calculating an angle in an unknown triangle can be done using the law of cosines:

$$c^2 = a^2 + b^2 - 2ab * \cos \theta$$

By calculating the lengths of a , b , and c using the provided coordinates and the diagram above, you can use your programming language's built-in inverse cosine function to find the value of the angle θ .

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 four decimal values, separated by spaces:

- The X coordinate of Earth
- The Y coordinate of Earth
- The X coordinate of Mars
- The Y coordinate of Mars

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91.613 0.0 0.0 144.95

64.78 64.78 -102.495 -102.495

Sample Output

For each test case, your program must print the word "VACATION" if a solar conjunction is preventing communication between Earth and Mars or the phrase "WORKING HARD" otherwise.

WORKING HARD

VACATION