Laboratory 2:
Using if statements

1. Write programs that ask the user for input and then print out the values of the following expression **without** using the abs function in Python.

   (a) $|x-1|$

   (b) $|x+1|+|x-1|$

   (c) $\dfrac{x^2+x+1}{x^2-x-4}$ (or the string “Infinite” if the denominator is zero).

   (d) $|x-3|+\dfrac{|x-2|}{|x^2-2.1|}$

2. A program that asks the user for input, the strength of an earthquake, and then prints out a string according to the following table. Values below 1 are not on the Richter scale.

Magnitude	Description
[1, 2)	Micro
[2, 4)	Minor
[4, 5)	Light
[5, 6)	Moderate
[6, 7)	Strong
[7, 8)	Major
[8, ∞)	Great

3. A program that asks the user for a number and then decides whether the number is either a divisible by 2 or divisible by 3, but not by both.

4. Heron's method calculates an approximation to the square-root. If S is the number whose square-root is to be taken, and a is an approximation of the square-root, then Heron's method calculates a better approximation by

$$a_{\text{better}} = \frac{1}{2}\left(a + \frac{S}{a}\right)$$

   For example, if $S = 2$ and we choose $a = 1$, then the better approximation according to Heron's is 1.5. If we apply the method again, then we get 1.4166666666666665. Another application gives us 1.4142156862745097, which is already accurate to the fifth digit after the decimal. Write a program that asks the user for a number. Calculate an approximation of the square-root by starting out with initial approximation 1 and then running Heron's method three times to get a better approximation.
5. Change the previous program by also calculating the true square-root using the ** operator.