

# Jupyter Lab Intro

1/8/20

PH211

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When dealing with areas of study that require collecting and plotting data, calculating large numbers, and performing complex mathematical operations, it can be extremely tedious and time consuming. The purpose of this lab is to learn how to use tools and technology that make these tasks more efficient and improve accuracy. Learning to use different programming languages serves as a great tool that will play a key role in the advancement of science and engineering.

The Pythagorean Theorem represents the relationship between each of the three sides of a right triangle. Here's the formula:

$$a^2 + b^2 = c^2$$

it can also be written as:

$$c = \sqrt{a^2 + b^2}$$

The Quadratic Formula provides the solutions to a quadratic equation. Here's the formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

```
In [24]: print("Some basic math operations:")
print()
print("((7 x 6)/5 x (12 x 30))/2 =")
print((((7*6)/5)*(12*30))/2)
print()
print("(5^2 + 2^8)/2^2 =")
print((5**2+2**8)/2**2)
print()
print("The square root of 152680 =")
import math
print(math.sqrt(152680))
```

Some basic math operations:

$((7 \times 6)/5 \times (12 \times 30))/2 =$   
1512.0

$(5^2 + 2^8)/2^2 =$   
70.25

The square root of 152680 =  
390.74288221284337

```
In [44]: print("Finding side lengths of a right triangle using the Pythagorean Theorem:")
print()

import math

print("Side a = 35")
print("Side b = 7329")
a = 35
b = 7329

hypotenuse = str(math.sqrt(a**2 + b**2))
print("The hypotenuse = " + hypotenuse)
print()

print("Side b = 36")
print("Hypotenuse = 52")
b = 36
c = 52

a = str(math.sqrt(c**2 - b**2))
print("Side a = " + a)
print()

print("Side a = 6472")
print("Hypotenuse = 734502")
a = 6472
c = 734502

b = str(math.sqrt(c**2 - a**2))
print("Side b = " + b)
```

Finding side lengths of a right triangle using the Pythagorean Theorem:

Side a = 35  
Side b = 7329  
The hypotenuse = 7329.0835716343145

Side b = 36  
Hypotenuse = 52  
Side a = 37.52332607858744

Side a = 6472  
Hypotenuse = 734502  
Side b = 734473.4857161285