CS 110
Math in Python

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Announcements

- Check assignment page, second PA has been up
- Submitting to gradescope: matching output is the goal
- Groups
- Attendance:
  - if problems contact me or your TA **during** or immediately after class (in person)

The Mathematical Operators

+	Addition
-	Subtraction
*	Multiplication
/	Division
//	Integer Division
**	Exponent
%	Modulus

1. **P**arentheses,
2. **E**xponentiation
3. **M**ultiplication and **D**ivision have equal precedence
4. **A**ddition and **S**ubtraction have equal precedence

Trapezoid Area

Write a Python program to calculate the area of a trapezoid:
- A trapezoid is a quadrilateral with two sides parallel.
- The area of the trapezoid is calculated by measuring the average of the parallel sides (add **a** and **b** and divide result by 2) and multiplying it with its height (**h**).
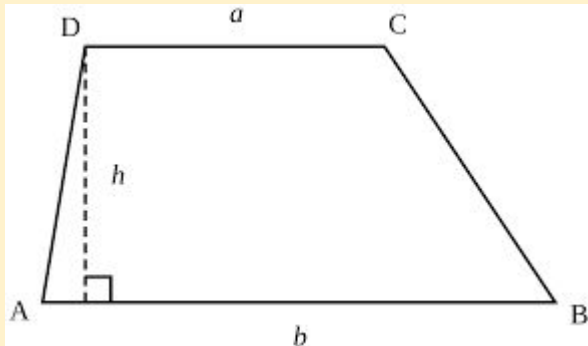
Test Data:

Height: 5

Base, first value: 5

Base, second value: 6

Expected Output:

Area is: 27.5

Round()

Use the *round()* function to get a floating-point number rounded to the specified number of decimals.

Syntax:
```
round(number, digit)
```

Example:
```
print(round(5.5678,2))
```

Surface Volume and Area of a Sphere

Write a Python program to calculate surface volume and area of a sphere
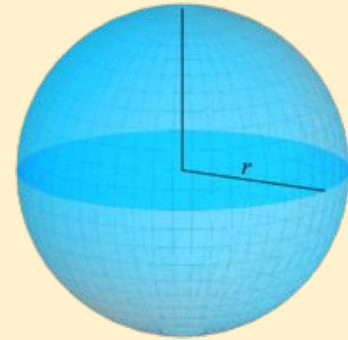- the volume inside a sphere is derived to be:

$$V = \frac{4}{3} \pi r^3$$

- The area (or surface) is:

$$A = 4 \pi r^2$$

where **r** is the radius of the sphere

Test case:

Radius of sphere: .75

Surface Area is: 7.07
Volume is: 1.77

Attendance answer: sarandy

If-statements

[Style Guide](#)

The if-statement

- If statements can be used to **run code conditionally**
  - **Before if-statements:** Code has pretty much just run in a straight line
  - **With ifs:** Can run code optionally, depending on the value of a condition
- This means our code can **branch** in different directions

```python
if condition:
    statement 1
    statement 2
    . . .
    statement N
```

Determining Boxing weight class

- Write a program that accepts one number (a person's weight in lbs)
- Determines if that person is a **flyweight**, **heavyweight**, or within an **in-between weight class**
- https://en.wikipedia.org/wiki/Weight_class_%28boxing%29

Divisions	Weights
Heavyweight	200+ lbs
Light heavyweight	168–175 lbs
Middleweight	154–160 lbs
Welterweight	140–147 lbs
Lightweight	130–135 lbs
Featherweight	122–126 lbs
Bantamweight	115–118 lbs
Flyweight	108–112 lbs

Determining Boxing weight class

- Write a program that accepts one number (a person's weight in lbs)
- Determines if that person is a **flyweight**, **heavyweight**, or within an **in-between weight class**
- https://en.wikipedia.org/wiki/Weight_class_%28boxing%29

Division	Weight
Heavyweight	200 + lbs
Mediumweight	Between 108 and 200 lbs
Flyweight	108 or less lbs

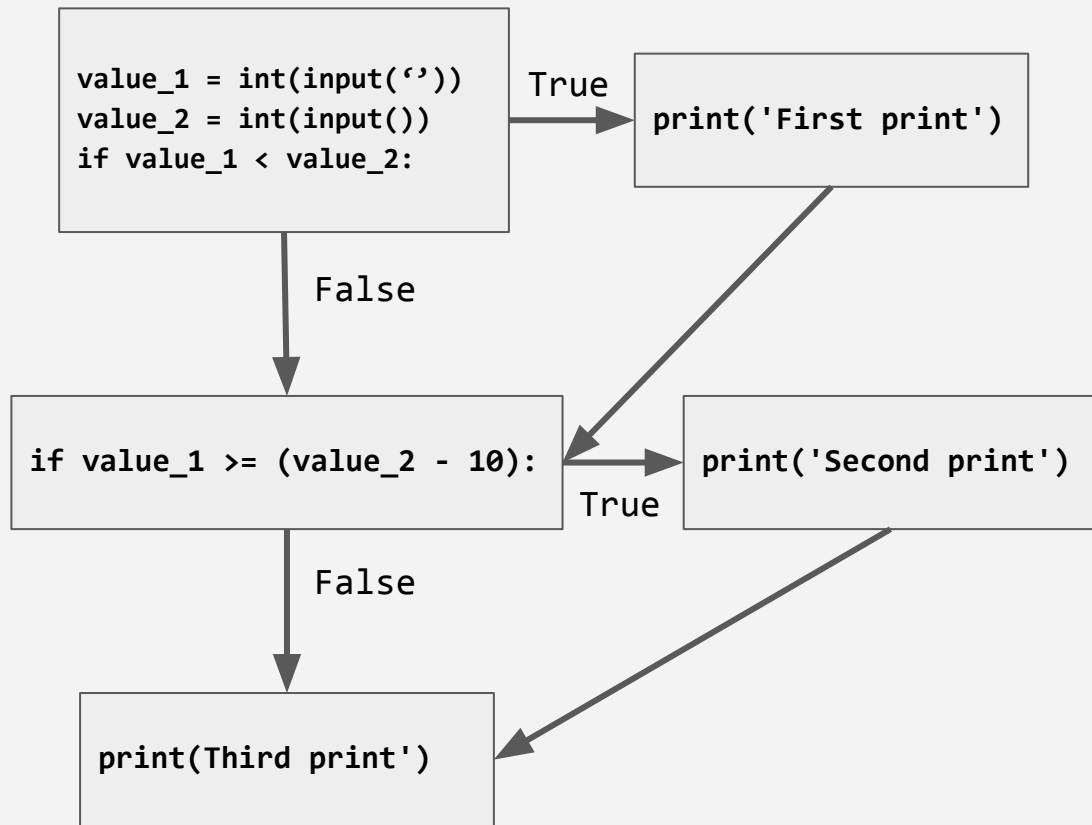# What is a control-flow graph (CFG)

- A diagram that breaks down the code into all chunks that will always run in sequence, and shows the possible paths that can be taken
- Along the lines of decision structure

```python
value_1 = int(input(''))
value_2 = int(input(''))

if value_1 < value_2:
    print('First print')

if value_1 >= (value_2 - 10):
    print('Second print')

print('Third print')
```

Ifs and Prints

Draw the CFG

```python
age = int(input('How old are you? \n'))

if age >= 18:
    print('You may apply to join the military')
if age >= 21:
    print('You may drink')
if age > 35:
    print('You may run for president')
```

Ifs and Prints

What happens when the user types in a non-integer?

```python
age = int(input('How old are you? \n'))

if age >= 18:
    print('You may apply to join the military')
if age >= 21:
    print('You may drink')
if age > 35:
    print('You may run for president')
```

Checking for numbers

- You can use the function **isnumeric()** to determine if a string represents a number
- Makes sure a string contains only digits

Checking for numbers

- You can use the function **isnumeric()** to determine if a string represents a number
- Makes sure a string contains only digits
- For example:

```
name = 'Jimmy'          age = 37
name.isnumeric()        age.isnumeric()
```