Conditionals & Control Structures

By Tooba Ahmed Alvi

Recap from last lecture.....

Defining Variables

We define variables by writing the variable's name, followed by an equals sign, and then what we want to store inside.

```
var_name = value
```

Using variables

When we use the variable's name—unless we are changing its value—we essentially open the "suitcase" to use what's inside.

```
print(var_name)
sum = num1 + num2
```

Variable Types

`Strings`:

Words/Sentences

"This is a string"

`Ints`:

Integers; numbers without decimals

24

`Floats`:

Any other number that isn't an integer

24.2

Sometimes, we can **change from one variable type to another** via ***typecasting***. For example, we may have a number represented as a string, and we need to cast it to be a number so we can do math with it!

INPUT AND OUT PUT CONCEPT- EXAMPLE

Sample Input

```
Enter a weight on Earth:
```

↓

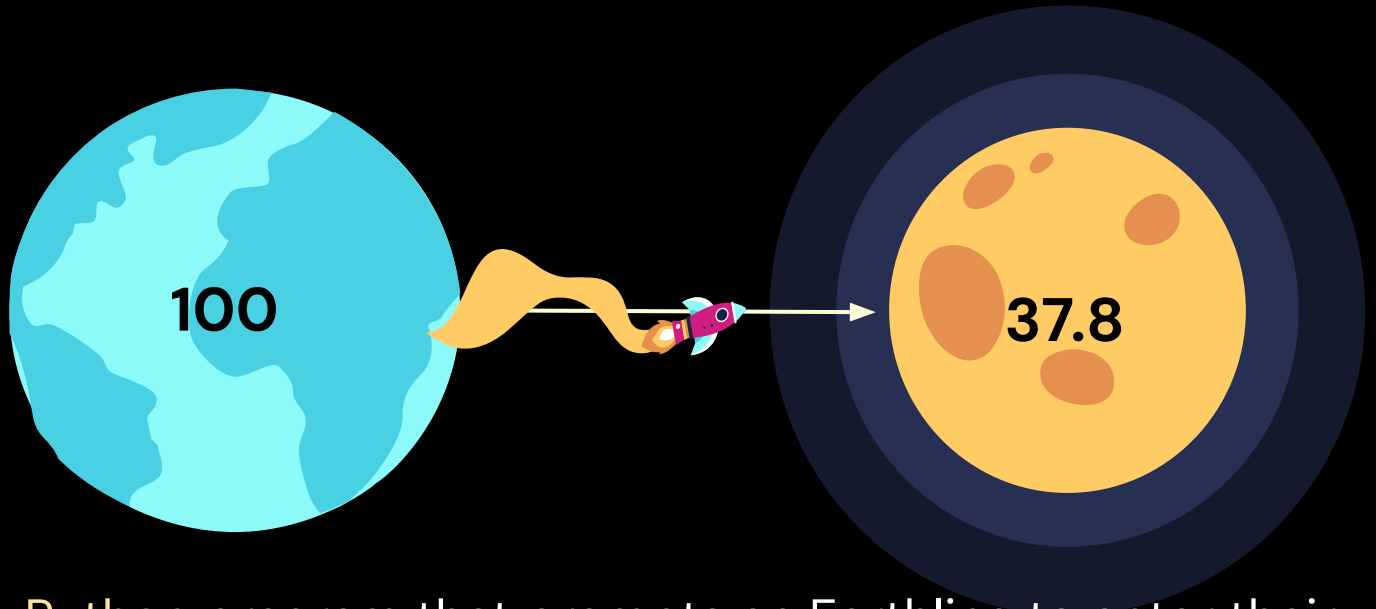
```
Enter a weight on Earth: 100
```

* ***User input*** is italicized and bolded for visual clarity *

Sample Output

```
The equivalent weight on Mars: 37.8
```

Let's Code!



Write a Python program that prompts an Earthling to enter their weight on Earth and then to enter the name of a planet in our solar system. The program should print the equivalent weight on that planet.

If/Elif/Else Statements

As a quick reminder:

- If-Statements take a condition and only runs a block of code if the condition evaluates to `True`.
- Elif-Statements take a condition and only tests it if the prior If-Statement (and all prior Elif-Statements) evaluate to `False`.
- Else-Statements take no condition and runs a block of code if the prior If-Statement (and Elif-Statements, if there are any) evaluate to `False`.

Still confused? Don't worry! We'll practice on these next slides! :)

If/Elif/Else Statements

You can think of these as a forked road!
Let's run through some examples.

If/Elif/Else Statements

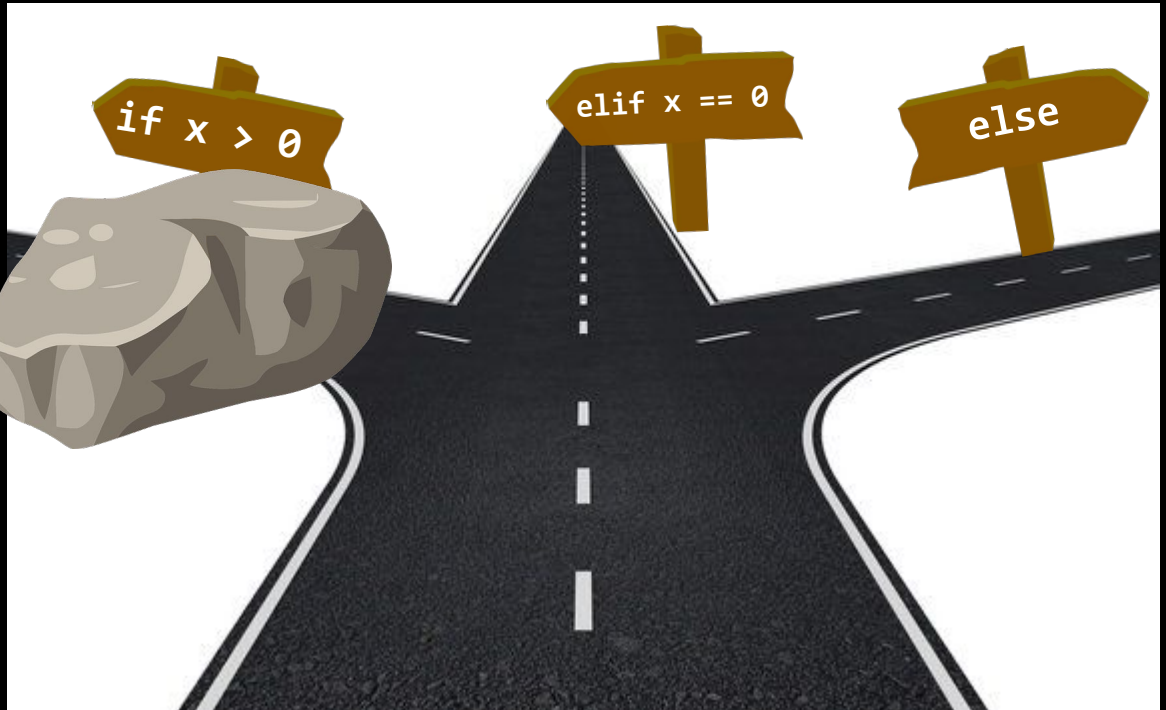
```
x = 0
```

Which path would we take: left, middle, or right?

If/Elif/Else Statements

```
x = 0
```

Which path would we take: left, middle, or right?



If/Elif/Else Statements

```
x = -5
```

Which path would we take: left, middle, or right?

If/Elif/Else Statements

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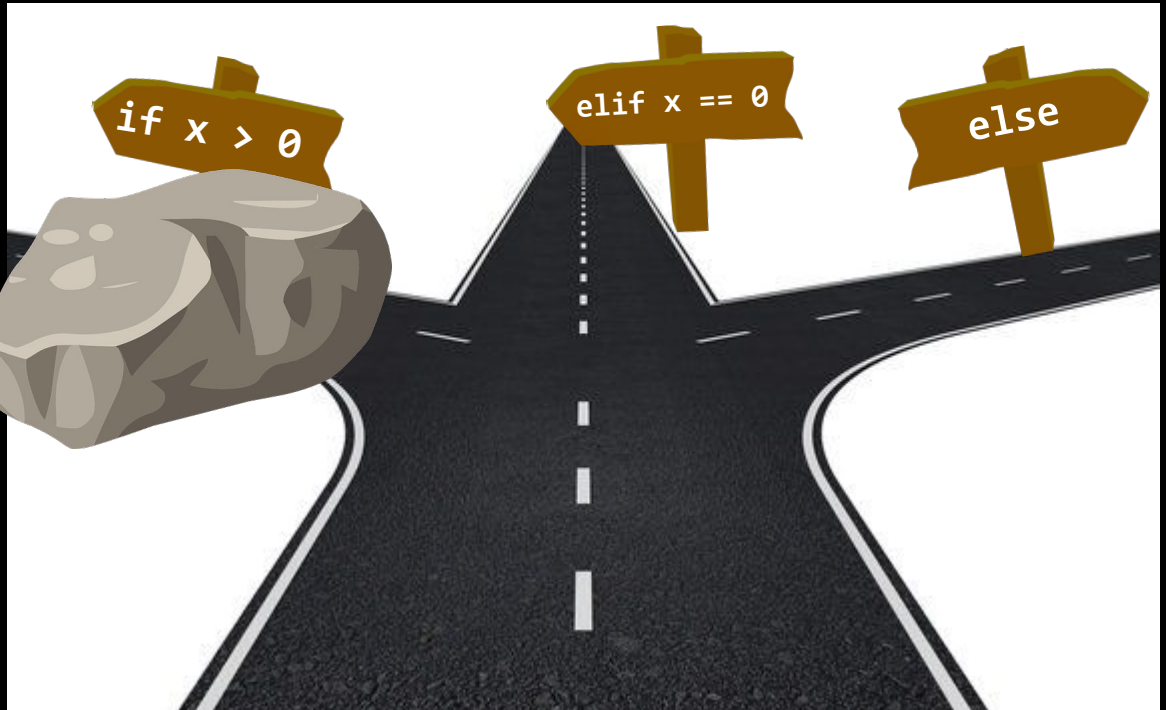
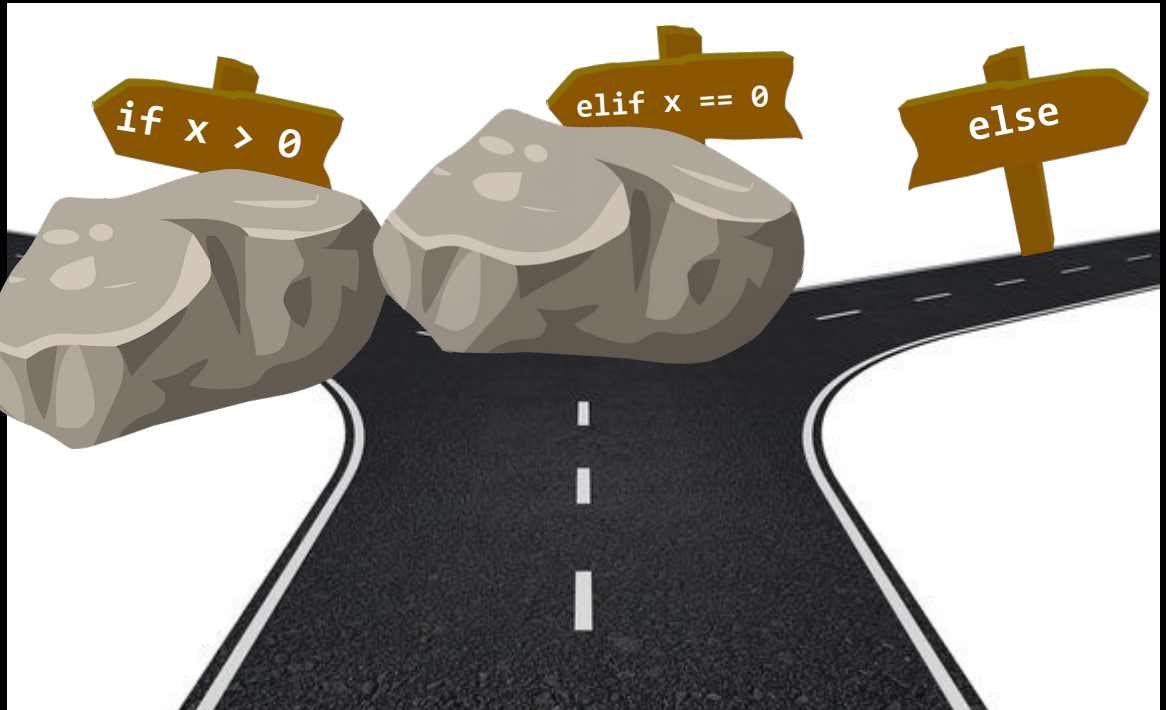


If/Elif/Else Statements

```
x = -5
```

Which path would we take: left, middle, or right?



If/Elif/Else Statements

```
x = 8
```

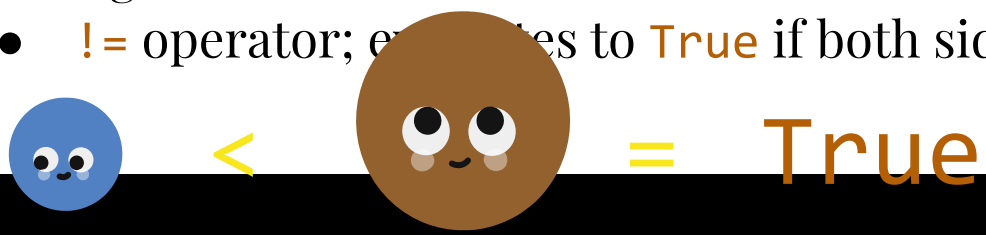
Which path would we take: left, middle, or right?

Comparison Operators

When you're working in Python (especially with numbers) there are many times where you need to compare two different values.

In the context of numbers, the main comparison operators you'll see are:

- `==` operator; evaluates to `True` if both sides are equivalent
- `>` operator; evaluates to `True` if the left side is larger than the right
- `<` operator; evaluates to `True` if the left side is smaller than the right
- `!=` operator; evaluates to `True` if both sides are NOT equivalent



Logical Operators

Lastly, there are times where we want to write code that requires multiple or more complex conditions.

Going over the logical operators again, we have:

- `and` operator; only runs code if both conditions joined by it evaluate to `True`. If either is `False`, the entire statement is `False`!
- `or` operator; runs code if either of the conditions joined by it evaluate to `True`. The entire statement is only ever `False` if both conditions are `False`!
- `not` operator; only takes in one condition! It then swaps the condition's evaluation. This means if a condition previously evaluated to `True` it becomes `False` and vice-versa.

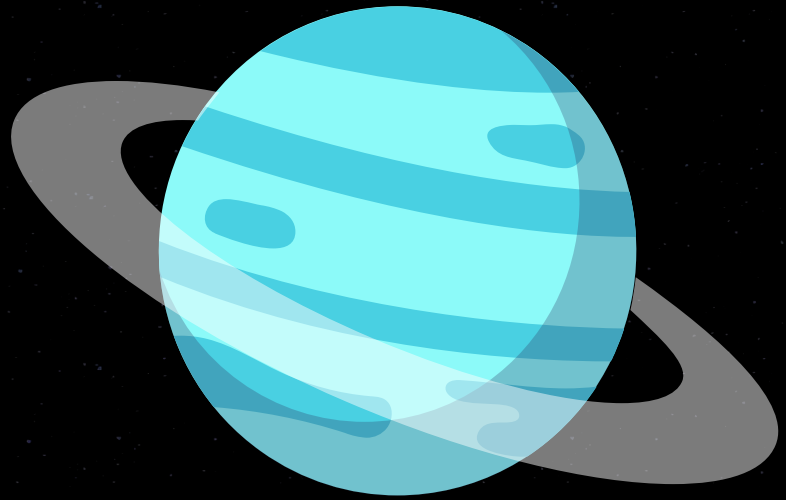
Questions?

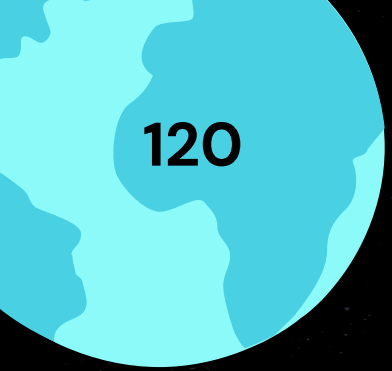
What questions do you have before we start this week's problem?

Week Problem #2: To Infinity & Beyond

Here's a list of constants for each planet's gravity compared to Earth's:

- Mercury: 37.6%
- Venus: 88.9%
- Mars: 37.8%
- Jupiter: 236.0%
- Saturn: 108.1%
- Uranus: 81.5%
- Neptune: 114.0%





Week Problem #2: End Goals

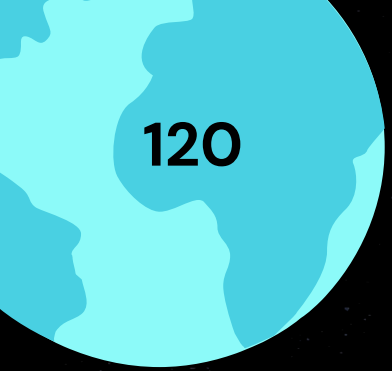
Sample Input

```
Enter a weight on Earth:

Enter a weight on Earth: 120

Enter a planet:

Enter a planet: Mars
```

* ***User input*** is italicized and bolded for visual clarity *

Sample Output

```
The equivalent weight on
Mars: 45.36
```

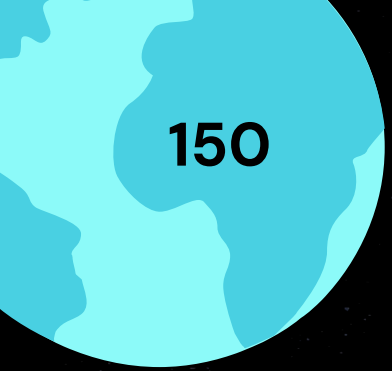


Section Problem #2: End Goals

Full Run

```
Enter a weight on Earth: 120
    Enter a planet: Mars
  The equivalent weight on
        Mars: 45.36
```

* ***User input*** is italicized and bolded for visual clarity *



Section Problem #2: End Goals

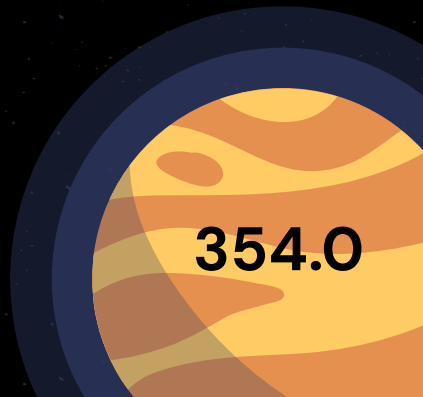
Sample Input

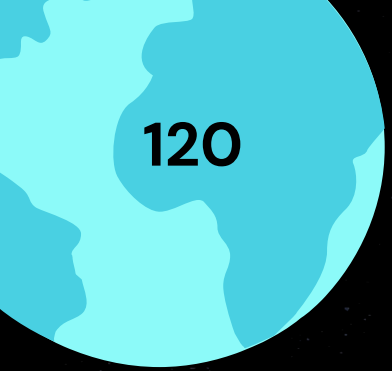
```
Enter a weight on Earth:

Enter a weight on Earth: 150

Enter a planet:

Enter a planet: Jupiter
```

* ***User input*** is italicized and bolded for visual clarity *

Sample Output

```
The equivalent weight on
Jupiter: 354.0
```



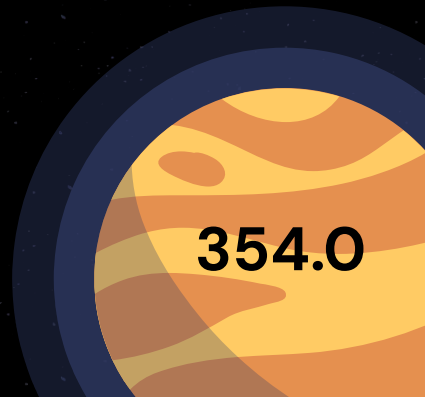


Section Problem #2: End Goals

Full Run

```
Enter a weight on Earth: 150
Enter a planet: Jupiter
The equivalent weight on
Jupiter: 354.0
```

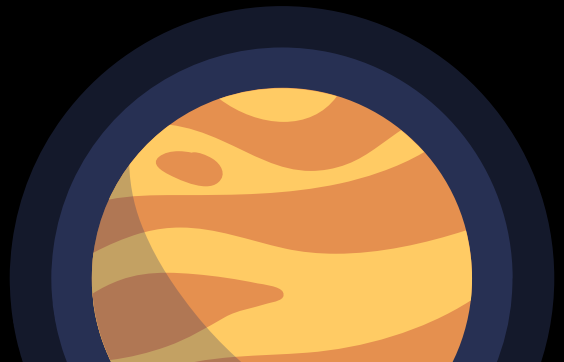
* ***User input*** is italicized and bolded
for visual clarity *



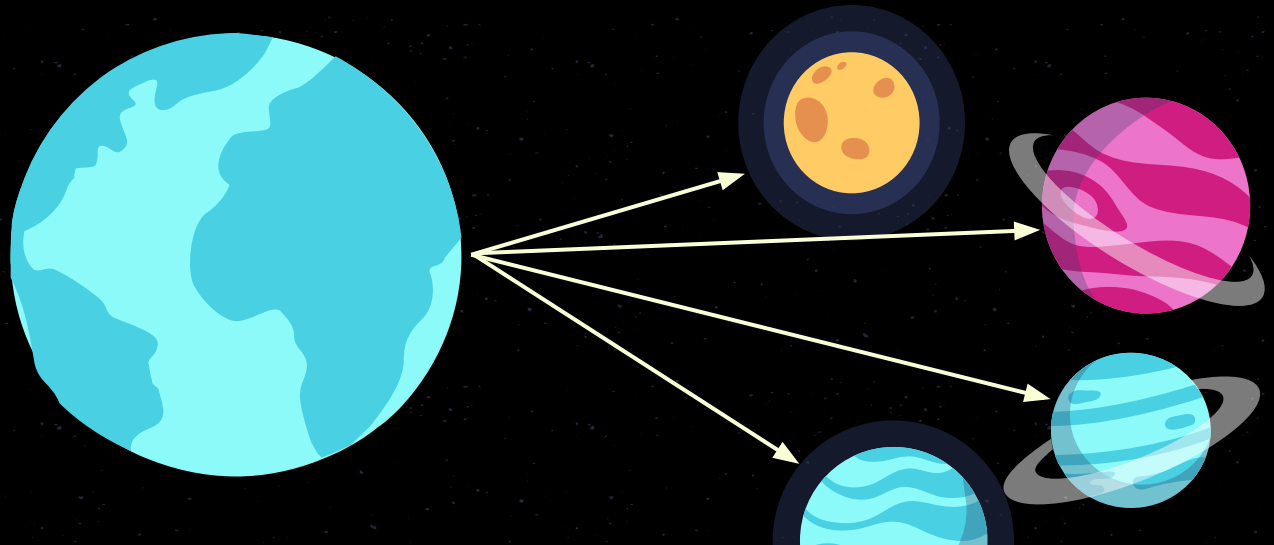
Pre-Code Discussion

What's different?

(Also, questions if you have them!!!)



Let’s Code!



High Low

Week Problem

Setting Context

You are a game developer tasked with creating the next hit game: **High-Low**.

The game goes like this:

- Two numbers are generated from 1 to 100 (inclusive on both ends): one for you and one for a computer, who will be your opponent. You don't get to see what number the computer has!
- You make a guess, saying your number is either higher than or lower than the computer's number
- If your guess matches the truth (ex. you guess your number is higher, and then your number is actually higher than the computer's), you get a point!

These steps make up one round of the game. The game is over after all rounds have been played. Let's walk through an example of one round of High-Low!

Example Round

Step One: Generate the Numbers

Your Number	Your Choice	Computer's Number
?	?	?

Example Round

Step One: Generate the Numbers

Your Number	Your Choice	Computer's Number
88	?	?

Example Round

Step Two: Make Your Choice (higher or lower)

Your Number	Your Choice	Computer's Number
88	?	?

Example Round

Step Two: Make Your Choice (higher or lower)

Your Number	Your Choice	Computer's Number
88	higher	?

Example Round

Step Three: Check the Results

Your Number	Your Choice	Computer's Number
88	higher	?

Example Round

Step Three: Check the Results

Your Number	Your Choice	Computer's Number
88	higher	35

Example Round

Step Four: Be Happy You Won!!

Your Number	Your Choice	Computer's Number
88	higher	35

Questions?