

Lesson 1

July 7, 2020

1 Lesson 1: Introduction to Programming I

1.1 A Big Calculator

A computer is, at heart, a very complex calculator. We can use the computer to perform calculations using the +, -, *, and / operators to add, subtract, multiply, and divide, respectively. Parentheses () also work the same way as in the order of operations; anything in parentheses is performed before other operations.

```
[2]: print(4.4 + 5.3)
```

9.7

The print() command outputs the value calculated within the parentheses to the console below.

```
[3]: print(2498752 + 91974642)
```

94473394

1.2 Other Operations

Just like you learned in math class, all of the common mathematical operators work exactly the same in Python as they do on a trusty calculator:

```
[8]: print(17 + 34)
      print(103 - 87)
      print(14 * 4)
      print(123 / 3)
      print(1 + (2 * 3) / 6)
```

51
16
56
41
2

Notice that parentheses () also work the same in coding mathematical operations as they do in math, following the order of operations (can you please excuse my dear Aunt Sally?)

1.3 Comments

Comments are lines of code that are ignored by the computer, but are useful to coders to write notes to themselves or others reading their code. A comment is created with the `#` symbol (`#CommentYourCode` will be trending any day now).

```
[9]: # Comments are not interpreted as code
     # print(19 + 1)
     print(7 * 6)
```

42

Only the output from line 3, which is not a comment, prints anything to the console.

Comments are really useful notes to yourself, so that you can look back at old code and understand what you did. Learn to comment your code now, and you'll thank yourself later!

1.4 Checkpoint #1

1) Add 6.3 to 8.2

```
[12]: print(6.3 + 8.2)
```

14.5

2) Multiply 45.5 by 3.4

```
[13]: print(45.5 * 3.4)
```

154.7

3) Convert 75 degrees Fahrenheit to Celsius. To calculate this, multiply the difference between the temperature in Fahrenheit and 32 by 0.556.

```
[14]: print((75 - 32) * 0.556)
```

23.908

```
[15]: print((212 - 32) * 0.556)
```

100.08

1.5 Variables

In programming, variables are placeholders for information you would like to store and use later. Variables are very common in algebra; for example, if we use `x` as a variable to store the value 3 (`x = 3`), then later we can recall this value 3 simply by recalling the variable `x`.

We can also use variables to perform calculations. For example, `2 * x` will return the value 6.

Finally, we can replace the value of a variable. That is, if we set `x = 4`, then the same calculation, `2 * x` will return the value 8.

```
[21]: # Create a variable, x, with the value 3
x = 3
print(x)
print(2 * x)
```

3
6

```
[20]: # Replace 3 such that x now stores the value 4
x = 4
print(x)
print(2 * x)
```

4
8

1.6 Checkpoint #2

Notice that it would be impractical to name all variables x or y . Rather, it is convention to give informative names to your variables, so that the name of the variable conveys some information about the value it holds. For example, in the temperature calculation example from Checkpoint #1, we could have created and calculated the answer with a variable $\text{tempInF} = 75$.

- 1) Imagine today is your 9th birthday. Create an informative variable to store your age (in years) called `ageInYears`. Calculate and print your age in days by multiplying `ageInYears` by the number of days in the year.

```
[22]: # My age in days if I'm 9 years old
ageInYears = 9
print(ageInYears * 365)
```

3285

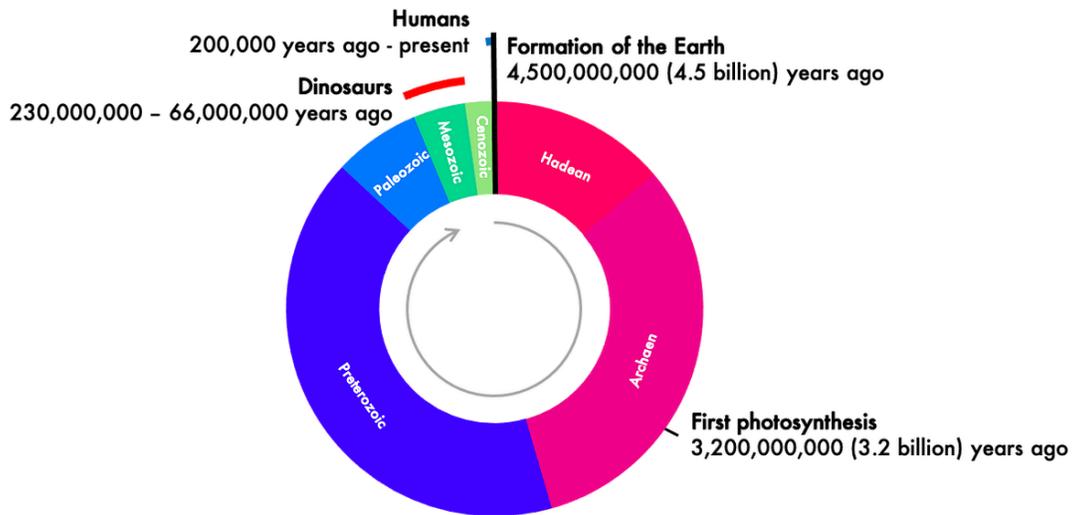
```
[23]: # My age in days if I'm 16 years old
ageInYears = 16
print(ageInYears * 365)
```

5840

1.7 Lesson 1 Summary

In this lesson, we've discussed how a computer really is just a big, complicated calculator. And we've learned how to perform some basic operations with this calculator: we can perform all of the normal algebraic operations. And we also learned how to store important numbers as variables, using those variables in operations.

- 1) Look at the following image, illustrating the timeline of the planet Earth's existence.



1) Calculate the following:

a) How old is the planet in days?

```
[31]: EarthInYears = 4500000000
      print(EarthInYears * 365)
```

1642500000000

b) For what percent of Earth's existence did dinosaurs roam the planet?

```
[36]: timeWithDinos = 230000000.0 - 66000000
      percWithDinos = (timeWithDinos / EarthInYears) * 100
      print(percWithDinos)
```

3.644444444444

c) For what percent of the Earth's existence have you been alive?

```
[37]: percWithMe = (16.0 / EarthInYears) * 100 # Assume I'm 16 years old
      print(percWithMe)
```

3.555555555556e-07