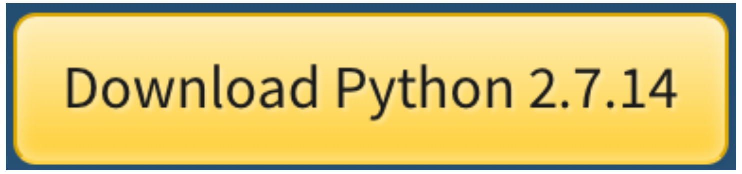
Programming in Python

Python

- Easy to learn!
- Extremely useful, widely used

Downloading / Installing Python

- We'll be using IDLE
- Check – might already be installed on computers (search IDLE in Windows)
- https://www.python.org/downloads/



- Install – ask me if you need help!

First Program: Hello World!

- “Print” a message

```
print(“Hello World”)
```

← Use “quotations” to print text

To run program: click on ▶

Variables

- Something that stores a value
- We can change these values and use them to store information

```
print(”Justin”)

name = “Justin”
print(name)
```

```
x = 2
print(x)
y = 3
print(y)

sum = x + y
print(sum)
```

If / else statements

- Used to do some task if a statement is a true
- Example: if x > 5, then print “x is greater than 5”

```
x = 3
if x > 5:
     print(“x is bigger than 5”)
else:
     print(“x is smaller than 5”)
```

Try it Yourself: Enter a number and print if it is positive or negative

Hint (obvious): all positive numbers are greater than 0, all negative numbers are less than 0

You can name your variable anything!

Solution

```
number = -10

if number > 0:
    print(“This number is positive”)
elif number < 0:
    print(“This number is negative”)
else:
    print(“This number is zero!”)
```

While loop

- While some statement is true, do this task
- When it is no longer true, stop doing that task

```
while True:
     print(“loop”)
```

This will run forever!
Careful!

```
while 1 < 2:
     print(“infinite loop!”)
```

```
x = 0
while x < 3:
     x = x + 1
     print(x)
```

This will print:

```
1
2
3
```

For Loops

- Loop over a specified range
- Good because no infinite loops!

```
for number in range(0,5):
     print(number)
```

”number” is a variable that is automatically created, is automatically set to 0

This will print:

```
0
1
2
3
4
```

Challenge

- Input: a number greater than 0
- Output: all even numbers between 0 and that number

- Hint: use a loop

- Another hint: *`range(1, 10, 2)`* gives you every other number from 1 to 10

Solution

```
input = 11
k = 0
while k < input:
      print(k)
      k += 2
```

OR

```
for i in range(0, input, 2):
      print(i)
```

These are all correct!
There are many ways to solve this problem!

Any questions?

Functions

- Create one piece of code that we can use many times

```
def function_name(input):
     do something
     return answer


def add_one(number):
     answer = number + 1
     return answer
```

Functions

```
def add_one(number):
    answer = number + 1
    return answer

number_plus_one = add_one(4)
print(number_plus_one)
```

What's happening here?

When we run this code:

1. Python sees that we defined a function "add_one"
2. Python remembers this, and moves on
3. Python creates a variable "number_plus_one"
4. "number_plus_one" uses the "add_one" function, so Python runs the "add_one" function with "4" as an input"
5. "add_one(4)" returns a value of 5
6. "number_plus_one" = 5
7. Python prints "number_plus_one", which is 5!

Try it yourself

- Write a function that takes prints your name and a message
- Example:
  - Input: “Justin”
  - Output: “Hello Justin”

- Hint: to print multiple things, use a comma or a “+” to separate strings
- Example:
  - print(“Hello Justin”)
  - print(“Hello“, “Justin”)
  - print(“Hello ” + “Justin”)

Solution

```
def say_hello(name):
    print(“Hello”, name + “!”)
say_hello(“Justin”)
```

Use “input” to write an interactive program!

“input” is a function included in Python!

```
name = raw_input(“Please enter your name: “)
say_hello(name)
```

More Functions

- Functions can have multiple inputs!

```
def add_numbers(a, b):
    sum = a + b
    return sum
```

Try it yourself

```
def print_name_and_age(name, age):
    result = name + “is ” + age + “ years old”
    return result

string1 = print_name_and_age(“Justin”, 21)

>>> Justin is 21 years old
```

Challenge: Calculator

- Create a function called “`Calculator`”
- Calculator should takes in three inputs:
  - number1
  - number2
  - “add” OR “subtract” OR “multiply” OR “divide”
- Calculator should perform the action on the two numbers and return the result
- Example:

```
result = Calculator(3, 4, ”add”)
print(result)

>>> 7
```

Hint

```
def Calculator(num1, num2, action):
    if action == “add”:
        result = num1 + num2
```

Lists

```
my_first_list = [1,2,3,4]

one = list[0]
two = list[1]
four = list[3]

print(one)
print(two)
```

- You can add numbers to a list!

```
      my_first_list.append(5)
      print(my_first_list)
```

- Or remove numbers from a list!

```
      my_first_list.remove(3)
      print(my_first_list)
```

“Modulo Operator”

```
Get remainder between two numbers: a % b

     Example:  12 % 6 == 0
               12 % 5 == 2
               10 % 3 == 1
               10 % 4 == ???
```

Challenge: Prime Numbers

1. Review: what is a prime number?
2. How do we know if a number is prime?

3. Task:
   - Create a function that tells the user if a number is prime or not

Functions within Functions

- We can use functions inside of other functions!
- Example:

```
def add_one(x):
      y = x + 1
      return y

def add_two(a):
      b = add_one(a)
      c = add_one(b)
      return c
```

Challenge: Functions within Functions

Task: Get all prime numbers within a range

- Input: A number greater than 0
- Output: All prime numbers from 1 to that number
- Example:
  - Input = 10
  - Output = 1, 2, 3, 5, 7

How do we approach this?

- Ideas?
- Recall, we already wrote a function that checks if a number is prime!