


Functions and Variables

Click Labs > launch button

ed launch lesson

Jupyter notebook on Ed Lesson

- code cell
- text cell (markdown syntax)
- run ( or `shift+enter` or `ctrl+enter`)
- autocomplete / syntax highlighting

Guide to Using Your Lab Notebook

- Structure
- During class
- Playgrounds
- For later

1. Hello World

```
Hello, World!
```

Anatomy

```
print("Hello, World")
```

- Function: `print()`
- Argument: `"Hello, World"`
- Side effect: print to the screen

Bugs

```
print("Hello world"
```

```
Cell In[1], line 1  
    print("hello world"
```

^

```
SyntaxError: incomplete input
```

2. Hello to You

```
What's your name? John  
Hello, John!
```


Anatomy

```
answer = input("What's your name? ")
```

- Function: `input()`
- Argument: `"What's your name? "`
- Side effect: prompt the user and wait for input
- Return values: user input
- Variable: `answer`

Hello to You?

```
answer = input("What's your name? ")  
print("Hello, answer")
```

Joining strings and variables (+)

```
answer = input("What's your name? ")  
print("Hello " + answer)
```

Joining strings and variables (multiple arguments)

```
answer = input("What's your name? ")  
print("Hello", answer)
```

```
help(print)
```

Help on built-in function print in module builtins:

```
print(*args, sep=' ', end='\n', file=None, flush=False)
    Prints the values to a stream, or to sys.stdout by default.

    sep
        string inserted between values, default a space.
    end
        string appended after the last value, default a newline.
    file
        a file-like object (stream); defaults to the current sys.stdout.
    flush
        whether to forcibly flush the stream.
```

Or, you can refer to the documentation online:

<https://docs.python.org/3/library/functions.html#print>

Joining strings and variables (f-string)

```
answer = input("What's your name? ")  
  
# print("Hello, answer")  
print(f"Hello, {answer}")
```

Comments

```
# + operator  
print("Hello " + answer)  
  
# multiple arguments  
print("Hello", answer)  
  
# f-string  
print(f"Hello {answer}")
```

3. Personalized Introduction

Requirements:

- Use Python's input() function to prompt the user for their name and age.
- Store these values in respective variables.
- Utilize the print() function and string formatting to display a message that says "Hello, my name is xx. I am xx years old." where the xx's are replaced with the user's name and age.

Expected Outputs:

```
What's your name? Emily  
How old are you? 25  
Hello, my name is Emily. I am 25 years old.
```


3. Personalized Introduction (solution)

```
name = input("What's your name? ")  
age = input("What's your age? ")  
  
print("Hello, my name is " + name + ". I am " + age + " years old.")
```

4. Uncooperative user

```
What is your name?    john  
Hello, John
```

```
What is your name? jAnE doE  
Hello, Jane Doe
```

String method

<https://docs.python.org/3/library/stdtypes.html#string-methods>

strip()

```
answer = input("What's your name? ")  
answer = answer.strip()  
print("Hello " + answer)
```

capitalize()

```
answer = input("What's your name? ")  
answer = answer.strip().capitalize()  
print("Hello " + answer)
```

title()

```
answer = input("What's your name? ")  
answer = answer.strip().title()  
print("Hello " + answer)
```

replace()

```
sentence = "I like apples, but I don't like green apples."  
new_sentence = sentence.replace("apples", "oranges")  
print(new_sentence)
```

split()

```
sentence = "I like apples, but I don't like green apples."  
words = sentence.split()  
print(words)
```


5. Hello Function

```
hello()  
# Output: Hello, World!
```

```
hello("John")  
# Output: Hello, John
```

def

```
def hello():  
    print("Hello world")  
  
answer = input("What's your name? ")  
  
hello()
```

Arguments

```
def hello(to):  
    print("Hello ", to)  
  
answer = input("What's your name? ")  
  
hello(answer)
```

Arguments with default values

```
def hello(to="world"):
    print("Hello ", to)

answer = input("What's your name? ")

hello(answer)
# Output: Hello name

hello()
# Output: Hello world
```

main

```
# Write main first
def main():

    answer = input("What's your name? ")

    hello()

# Then write hello
def hello():
    ...

# call main
main()
```

```
# Write main first
def main():

    answer = input("What's your name? ")

    hello()

# Then write hello
def hello():

    print("Hello ", answer)

# call main
main()
```

Scope

```
def main():  
    answer = input("What's your name? ")  
    hello(answer)  
  
def hello(to="world"):  
    print("Hello ", to)  
  
main()
```

return

```
def main():  
    answer = input("What's your name? ")  
    message = hello_message(answer)  
  
    print(message)  
  
def hello_message(to="world"):  
    msg = "Hello " + to  
  
    return msg  
  
main()
```


6. Personalized Introduction 2

Requirements:

- Define a function `ask_name()` that prompts the user for their name using Python's `input()` function and returns the name.
- Define another function `ask_age()` that prompts the user for their age and returns the age.
- Define a function `introduce_message()` that takes name and age as parameters and returns a string in the format "Hello, my name is [name]. I am [age] years old."

Expected Outputs:

```
Name: Emily
Age: 25
Hello, my name is Emily. I am 25 years old.
```

6. Personalized Introduction 2 (solution)

```
def main():
    name = ask_name()
    age = ask_age()
    message = introduce_message(name, age)

    print(message)

def ask_name():
    name = input("What's your name? ")

    return name

def ask_age():
    age = input("What's your age? ")

    return age

def introduce_message(name, age):
    msg = "Hello, my name is " + name + ". I am " + age + " years old."

    return msg

main()
```

7. calculator

```
Enter a number: 5  
Enter another number: 3  
8
```

```
def calculator():  
    x = input("Enter a number: ")  
    y = input("Enter another number: ")  
    z = x + y  
  
    print(z)  
  
calculator()
```

integer and `int()`

```
def calculator():  
    x = input("Enter a number: ")  
    y = input("Enter another number: ")  
    z = int(x) + int(y)  
  
    print(z)  
  
calculator()
```

`type()` to check variable type

```
x = input("Enter a number: ")
type_x = type(x)
print(type_x)

y = int(x)
type_y = type(y)
print(type_y)
```

style

```
def calculator():  
    x = input("Enter a number: ")  
    y = input("Enter another number: ")  
    z = int(x) + int(y)  
    print(z)
```

VS.

```
def calculator():  
    x = int(input("Enter a number: "))  
    y = int(input("Enter another number: "))  
    print(x+y)
```

VS.

```
def calculator():  
    print(int(input("Enter a number: ")) + int(input("Enter another number: ")))
```

floating-point numbers and `float()`

```
def calculator():  
    x = input("Enter a number: ")  
    y = input("Enter another number: ")  
  
    z = float(x) + float(y)  
  
    print(z)  
  
calculator()
```


type conversion functions

- `int()`
- `float()`
- `str()`
- ...

float formatting

```
def calculator():  
    x = input("Enter a number: ")  
    y = input("Enter another number: ")  
  
    z = float(x) + float(y)  
    print(f"{z:,.}")  
  
# try 1 and 999  
calculator()  
  
# Output: 1,000
```

float formatting

```
def calculator():  
    x = input("Enter a number: ")  
    y = input("Enter another number: ")  
  
    z = float(x) / float(y)  
    print(f"{z:.2f}")  
  
# try 2 and 3  
calculator()  
  
# Output: 0.67
```

round()

```
def calculator():  
    x = input("Enter a number: ")  
    y = input("Enter another number: ")  
  
    z = float(x) / float(y)  
  
    z = round(z, 2)  
  
    print(z)  
  
# try 2 and 3  
calculator()  
  
# Output: 0.67
```

8. Personalized Introduction 3

Requirements:

- Define a function `ask_birthyear()` that prompts the user for their birth year and returns it.
- Define another function `calc_age()` that takes the birth year as a parameter and returns the calculated age based on the current year (2023).
- Utilize the previously defined `ask_name()` and `introduce_message()` functions.
- Define a `main()` function that orchestrates the execution of these functions and prints the final introduction message.

Expected Outputs:

```
What's your name? Emily
What's your birth year? 1998
My name is Emily and I am 25 years old.
```

8. Personalized Introduction 3 (solution)

```
def main():
    name = ask_name()
    birthyear = ask_birthyear()
    birthyear_int = int(birthyear)

    age = calc_age(birthyear_int)
    age_str = str(age)

    message = introduce_message(name, age_str)
    print(message)

def ask_name():
    return input("What's your name? ")

def ask_birthyear():
    return input("What's your birth year? ")

def calc_age(birthyear):
    return 2023 - birthyear

def introduce_message(name, age):
    return "My name is " + name + " and I am " + age + " years old."

main()
```

Takehome exercise 1

- Course Logistics>Course Tools>DataCamp Signup
- **Use your mcgill email address**
- Introduction to Python: Chapter 1 and 3
- Due next week before the class