APS106

UNIVERSITY OF TORONTO

Forward Kinematics.

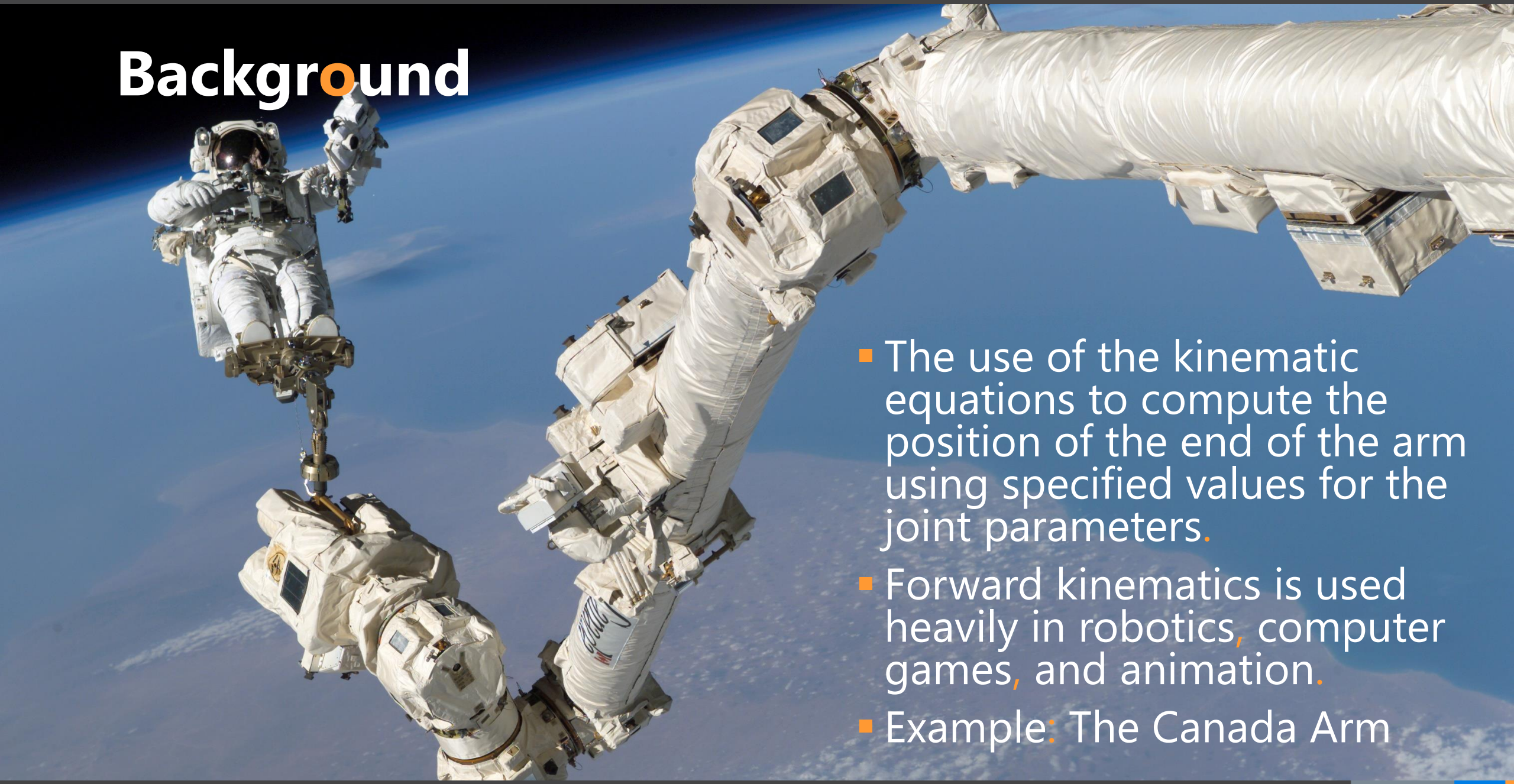
Design Problem 1

if nothing else, write #cleancode

Agenda

- Problem Background
- Learning Objectives
- Coding

Background

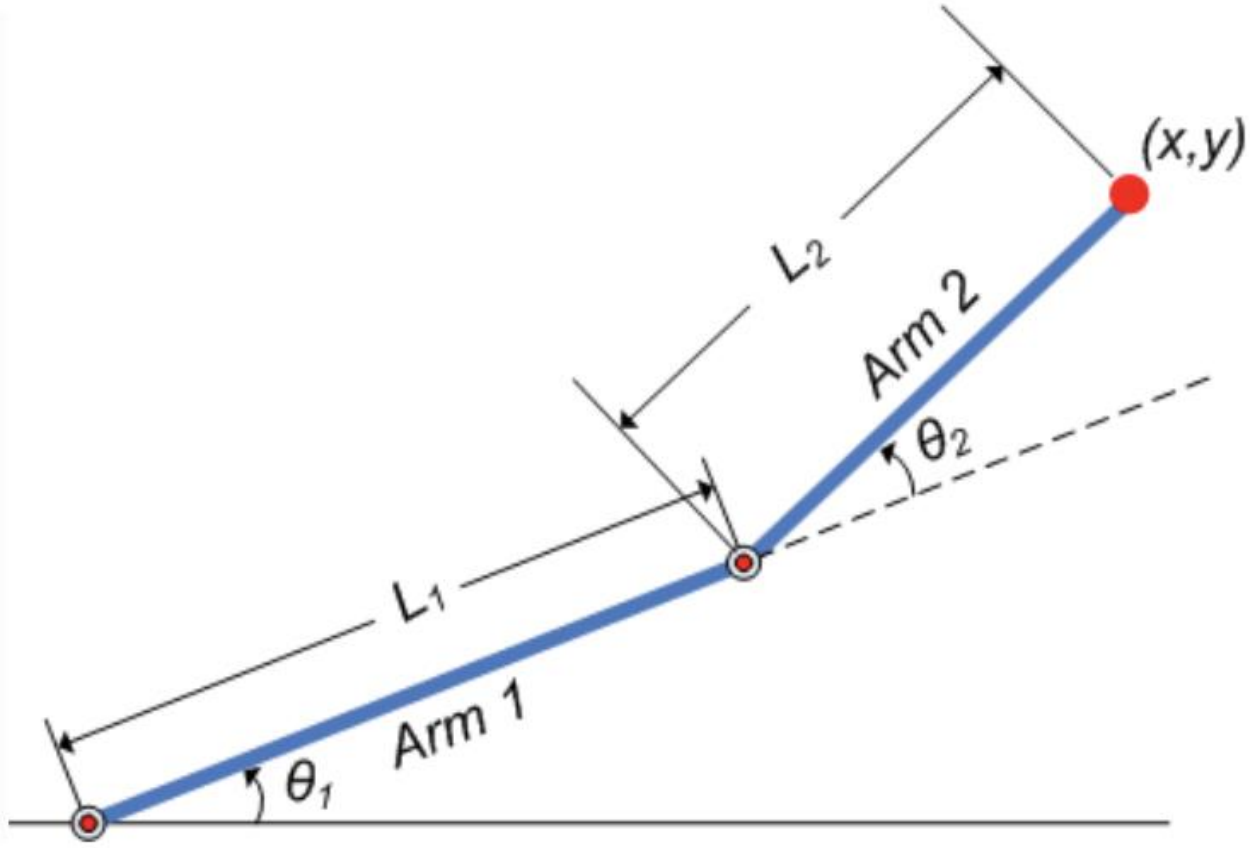


- The use of the kinematic equations to compute the position of the end of the arm using specified values for the joint parameters.
- Forward kinematics is used heavily in robotics, computer games, and animation.
- Example: The Canada Arm

Another cool example

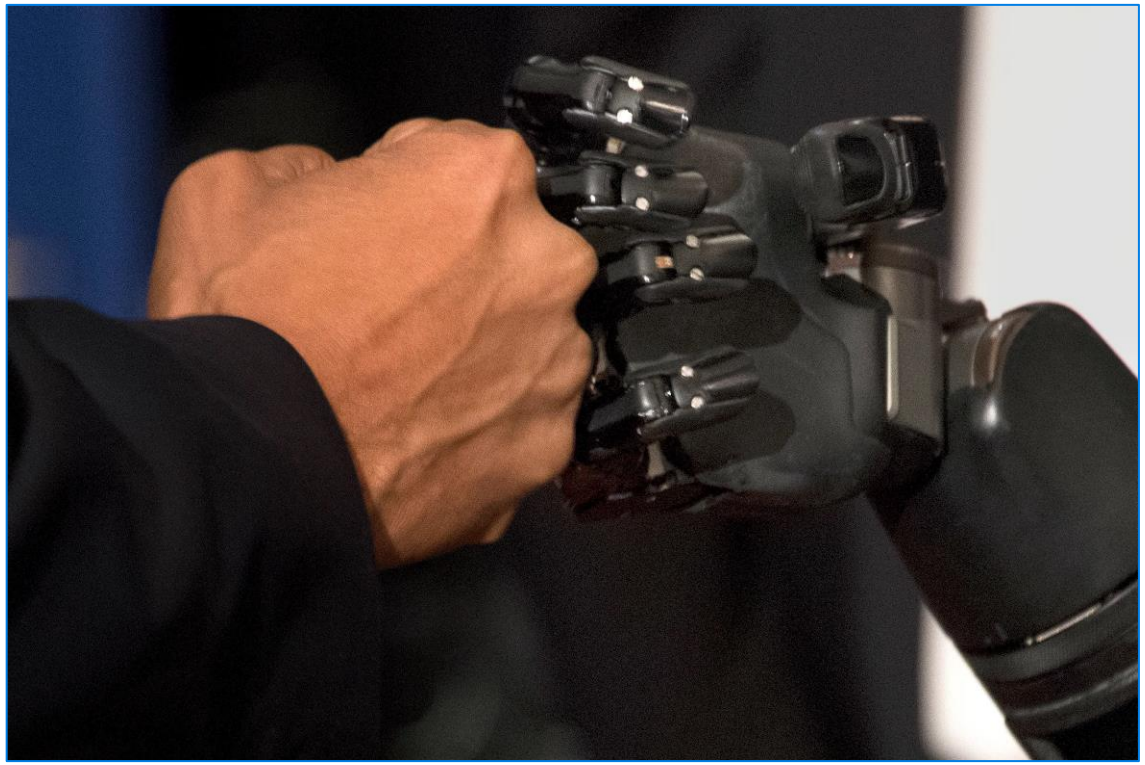
Background

- Will rely on trigonometry to find the positions.
- Goal: Create a program that will find the x- and y-position of the effector arm (i.e. the end of Arm #2).



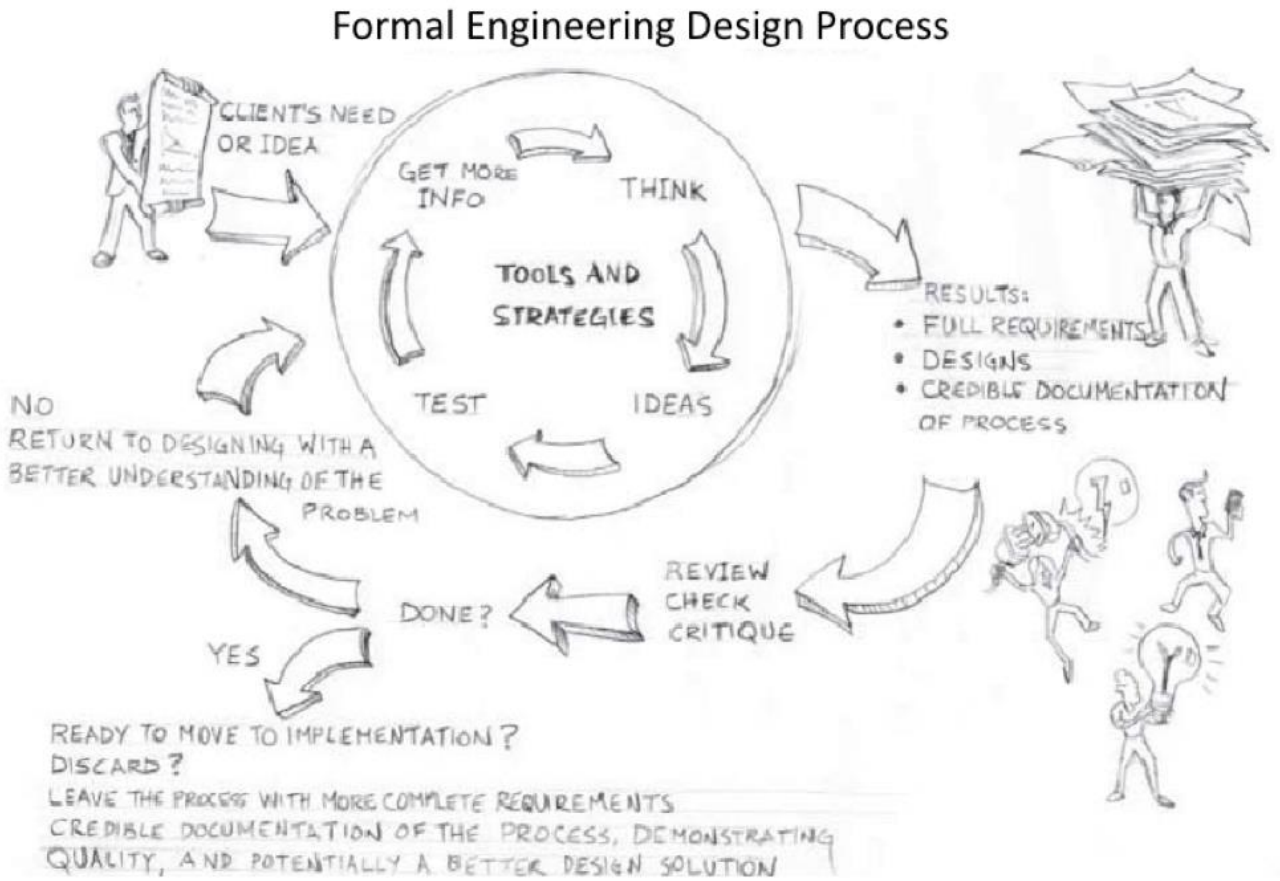
Learning Objectives

- Practice with user input.
- Learn to define and use custom functions.
- Practice with built-in libraries.
  - Optional: Add some cool visualization ☺



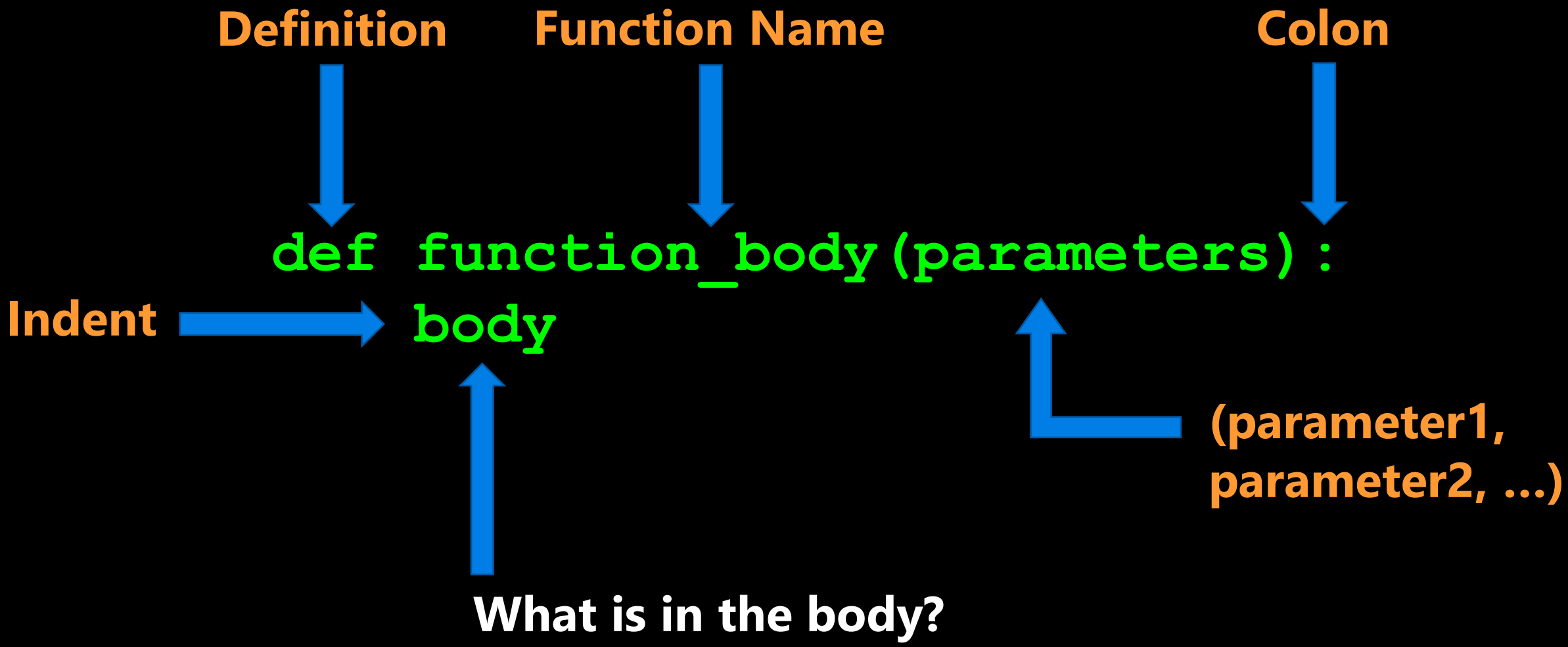
Engineering Design Process

- Learn to define the problem.
- Practice defining test cases.
- Develop an algorithm plan (i.e. a workflow!).
- Program your solution and debugging.



Some reminders.

Function Definitions



Function Definitions

```
def function_body(parameters):
```

1. """DOCSTRING""" (optional)

2. Code that does the thing

3. return [expression]
   The return statement is optional and if it is not included, it's the same as writing return None

Calling Functions

- The general form of a function call:

```
function_name(arguments)
```

- Terminology
  - *argument*: a value given to a function.
  - *pass*: to provide an argument to a function.
  - *call*: ask Python to execute a function (by name).
  - *return*: give a value back to where the function was called from.

In **Python** names of variables and functions use low case and underscores.

```
function_name
Function_Name
FunctionName
```

Input

- Python has a built-in function named **input** for reading text from the user.
- The general form of a **input** function call:

```
input(argument)
```

- The argument is the text you want displayed to the user.
  - *"What is your name?"*
- The value returned by the **input**function is always a string.

Importing Functions and Modules

- The general for of an import statement is:
  - `import module_name`
- To access a function within a module:
  - `module_name.function_name`

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