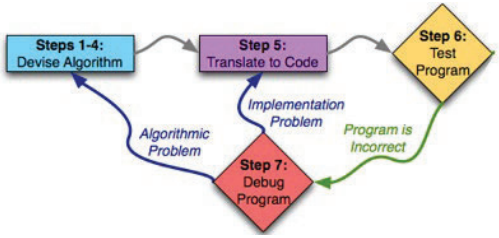
Compsci 101
7-steps, Functions, Order of Execution



Specification

```
filename: Laundry.py

def minutesNeeded(m):
    """
    Return integer number of minutes
    """
```

Susan Rodger

January 19, 2023

Reminder

- **Don't sit in the last 5 rows ever**
- **Also don't sit in that tiny 2 person row ever.**

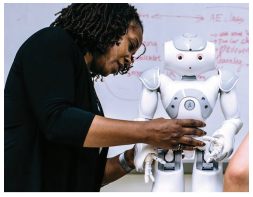
- **Come closer and meet someone**

C is for …

- **Computer Science and Computing**
  - It's what we do
- **Cookies**
  - Good for the web and for …
- **CSV**
  - Comma Separated Values: Data
- **ChatGPT**
  - Trained AI model to answer questions

Ayanna Howard

- **Educator, Researcher and Innovator**
- **BS Brown, MS/PhD USC, MBA Claremont**
- **Was Professor, Georgia Tech**
- **Now Dean of Engineering at Ohio State**
- **Robotics – Robots and Bias, Robots changing lives of children with disabilities, Robots beyond part of the family**
- **Top 50 U.S. Women in Tech, Forbes, 2018**



"I believe that every engineer has a responsibility to make the world a better place. We are gifted with an amazing power to take people's wishes and make them a reality."

Announcements

- **Lab 01 Friday,**
  - Complete Prelab before going to lab
- **APT-1 out today, due Thursday, January 26**
- **Assignment 0 due Today!**
  - Due to Drop/Add -> ok to turn in by Jan 26
- **Sakai quizzes on readings due 10:15am on date due**
  - Get three tries, score highest score
  - First two weeks we allow you to submit late
  - First 5 quizzes turn off, 10:15am Jan 26

- **Read Ed Discussion Every Day – You will learn things!**
- **Reminder: Ed Discussion back channel in lecture!**

We are now in 2cd week of Drop/Add

- **What does that mean?**
  - You cannot add any course without a permission number!
- **If you decide to change your lab section and drop the course and re-add the new lab section**
  - you will NOT be able to re-Add it without a permission number
  - Get that permission number first!
  - Email Prof. Velasco with Subject: CompSci 101

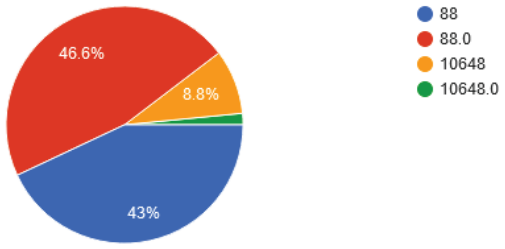
Go over answers from last WOTO

x = 8
y = 3
z = 2.0

x/y*z	**5.333333**
x + y * y	**17**
(x+y)*z3**	

What is (x + y) * z ** 3

193 responses



Go over answers from last WOTO

x = 8
y = 3
z = 2.0

x/y*z	**5.333333**
x + y * y	**17**
(x+y)*z3**	
=(x+y)*(z3)**	**11 * 8.0 = 88.0**

** higher precedence than *

a = "Duke"
b = "CoolColors"

a+a	**"DukeDuke"**
a+3	**ERROR**
a*3	**"DukeDukeDuke"**
a+b	**"DukeCoolColors"**

Go over answers from last WOTO

x = 8

y = 3

z = 2.0

x/y*z

x + y * y

(x+y)*z3**

a = "Duke"

b = "CoolColors"

a+a

a+3

a*3

a+b

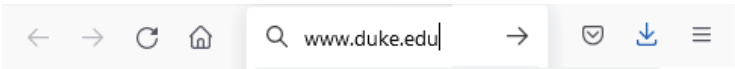
PFTD

- Functions
- Order of execution
- 7 steps of programming
- APTs
- Testing and Submitting APTs

What is a Function?

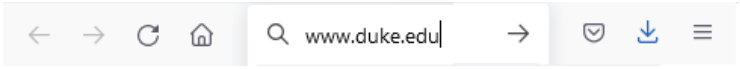
- **Function has:**
  - Name
  - Maybe inputs
  - Processes or calculates something
  - Has a result

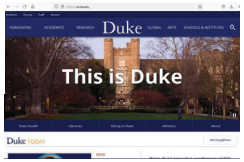
Functions in the Real World: URL in webpage



- **Function has:**
  - Name: “Search”
  - Input: www.duke.edu
  - Calculates:
  - Returns back:

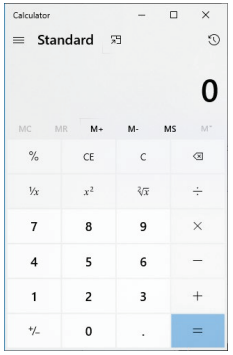
Functions in the Real World: URL in webpage





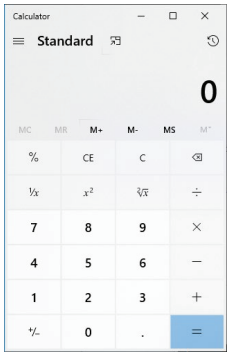
- **Function has:**
  - Name: "Search"
  - Input: www.duke.edu
  - Calculates: Figures out where web page is
  - Returns back: the actual web page

Functions in the Real World: calculator



- **Function has:**
  - Name: calculator
  - Input: number(s), operator
    - Example: 25, squareroot
  - Calculates:
  - Returns back:

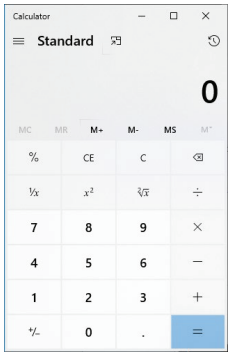
Functions in the Real World: calculator



- **Function has:**
  - Name: calculator
  - Input: number(s), operator
    - Example: 25, squareroot
  - Calculates: value of expression
  - Returns back:

$\sqrt{25}$

Functions in the Real World: calculator



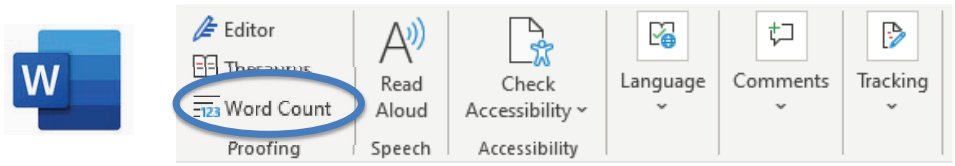
- **Function has:**
  - Name: calculator
  - Input: number(s), operator
    - Example: 25, squareroot
  - Calculates: value of expression
  - Returns back: **5**

$\sqrt{25}$

Functions in the Real World: Counting words in Microsoft Word

- **Function has:**
  - Name:
  - Input:
  - Calculates:
  - Returns back:

Functions in the Real World: Counting words in Microsoft Word



- **Function has:**
  - Name: Word Count
  - Input: contents of the document (e.g. a story)
  - Calculates: counts number of words
  - Returns back: number of words (e.g. 352)

Built-in Python Function – len() already exists, you use it

- **len()** function
- **Function has:**
  - Name: len
  - Input: a string
  - Calculates: number of characters in string
  - Returns back: number

Examples:

```
x = len("duke")
# value of x:

y = len("computer")
```


Built-in Python Function – len() already exists, you use it

- **len()** function
- **Function has:**
  - Name: len
  - Input: a string
  - Calculates: number of characters in string
  - Returns back: number

Examples:

```
x = len("duke")
# value of x: 4

y = len("computer")
# value of y: 8
```

Built-in Python Function – str() already exists, you use it

- **str()** function
- **Function has:**
  - Name: str
  - Input: an expression
  - Calculates: string version of expression's value
  - Returns back: string

Examples:

```
x = str(623)
# value of x: "623"

y = len( str( 2**8) )
  = len( str(256) )
  = len("256")
# value of y: 3

z = str(6 + 8.3)
# value of z: "14.3"
```


Built-in Python Function – str() already exists, you use it

- **str()** function
- **Function has:**
  - Name: str
  - Input: an expression
  - Calculates: string version of expression's value
  - Returns back: string

Examples:

```
x = str(623)
# value of x:

y = len( str( 2**8) )

z = str(6 + 8.3)
```


Other Python built-in functions

- `type(something)`
  - **Returns type of variable `something`**
- `int(7.8)`
  - **Returns integer value of decimal number, e.g. 7**
- `float(4)`
  - **Returns float value of integer, e.g. 4.0**

print() function

- **General function has:**
  - Name
  - Maybe inputs
  - Processes or calculates something
  - Has a result
- **print("hi cat")**
  - Name:
  - Input:

print() function

- **General function has:**
  - Name
  - Maybe inputs
  - Processes or calculates something
  - Has a result

  OUTPUT:
  hi cat

- **print("hi cat")**
  - Name: print
  - Input: "hi cat"
  - *processes*, *generates output*
  - Outputs value, No return value, returns None

No return value!

Example with lines numbered:

```
1  x = float(6)
2  print("x is", x)
3  y = print("x is", x)
4  print("y is", y)
```

Output:

Example with lines numbered:

```
1  x = float(6)
2  print("x is", x)
3  y = print("x is", x)
4  print("y is", y)
```

The variable x is assigned the value float(6) calculates

Output:

Example with lines numbered:

```
1  x = float(6)
2  print("x is", x)
3  y = print("x is", x)
4  print("y is", y)
```

Print does not return a value, so there is no "=", since there is no value to catch

Output:

```
x is 6.0
```

Example with lines numbered:

```
1  x = float(6)
2  print("x is", x)
3  y = print("x is", x)
4  print("y is", y)
```

What happens if we try to catch the return value in y?

No return value, so None is assigned to y

The RHS executes, and the print prints to output

Output:

```
x is 6.0
x is 6.0
```


Example with lines numbered:

```
1  x = float(6)
2  print("x is", x)
3  y = print("x is", x)
4  print("y is", y)
```

Correct way to use print

Wrong way to use print

Output:

```
x is 6.0
x is 6.0
y is None
```

The print function does NOT return a value. It just prints output.

Writing your own Python function

You replace Items in < >'s

- **Format:**

```
def <nameOfFunction>(<parameters>):
    <body, or lines of code>
    return <value>    # optional, but likely
```


Writing your own Python function

- **Format:**

```
def <nameOfFunction>(<parameters>):
    <body, or lines of code>
    return <value>    # optional, but likely
```

- **Example define function:**

Name of function

```
def inchesToCentimeters(inches):
    centi = inches * 2.54
    return centi
```

body

parameter

return value

Writing your own Python function

- **Format:**

```
def <nameOfFunction>(<parameters>):
    <body, or lines of code>
    return <value>    # optional, but likely
```

- **Example define function:**

```
def inchesToCentimeters(inches):
    centi = inches * 2.54
    return centi
```


Writing your own Python function

- **Format:**

```
def <nameOfFunction>(<parameters>):
    <body, or lines of code>
    return value    # optional, but likely
```

- **Example define function:**

```
def inchesToCentimeters(inches):
    centi = inches * 2.54
    return centi
```

- **Use or call function:**

```
answer = inchesToCentimeters(10.0)
print(answer)
```


Writing your own Python function

- **Format:**

```
def nameOfFunction(parameters):
    <body, or lines of code>
    return value    # optional, but likely
```

- **Example define function:**

```
def inchesToCentimeters(inches):
    centi = inches * 2.54
    return centi
```

Output:
25.4

- **Use or call function:**

```
answer = inchesToCentimeters(10.0)
print(answer)
```


Writing your own Python function

- **Parameter**
  - Variable, place holder for a value
  - In parenthesis in first line of definition of function
- **Argument**
  - Expression or value
  - In parenthesis when calling or using a function
- **Example:**

```
def inchesToCentimeters(inches):
    centi = inches * 2.54
    return centi
```

- **Use or call function:**

```
answer = inchesToCentimeters(10.0)
print(answer)
```

Writing your own Python function

- **Parameter**
  - Variable, place holder for a value
  - In parenthesis in first line of definition of function
- **Argument**
  - Expression or value
  - In parenthesis when calling or using a function
- **Example:**

```
def inchesToCentimeters(inches):
    centi = inches * 2.54
    return centi
```

parameter

- **Use or call function:**

```
answer = inchesToCentimeters(10.0)
print(answer)
```

argument

What happens when executes?

```
8  def inchesToCentimeters(inches):
9      centi = inches * 2.54
10     return centi
11
12
13 if __name__ == '__main__':
14     answer = inchesToCentimeters(10.0)
15     print(answer)
16     answer = inchesToCentimeters(3.0)
17     print(answer)
```

Output:

Start on line 1 of the file and move line by line
The first 7 lines are blank or are a comment, ignore.

What happens when executes?

```
8  def inchesToCentimeters(inches):
9      centi = inches * 2.54
10     return centi
11
12
13 if __name__ == '__main__':
14     answer = inchesToCentimeters(10.0)
15     print(answer)
16     answer = inchesToCentimeters(3.0)
17     print(answer)
```

Output:

Note function inchesToCentimeter is on line 8

What happens when executes?

```
8  def inchesToCentimeters(inches):
9      centi = inches * 2.54
10     return centi
11
12
13 if __name__ == '__main__':
14     answer = inchesToCentimeters(10.0)
15     print(answer)
16     answer = inchesToCentimeters(3.0)
17     print(answer)
```

Output:

Note lines below line 13 are indented 4 spaces each

Ignore lines 9 and 10 for now, so next line is line 13.
If __name__ == '__main__' is special and means:
Start executing program on next line

What happens when executes?

inches: 10.0

```
8   def inchesToCentimeters(inches):
9       centi = inches * 2.54
10      return centi
11
12
13  if __name__ == '__main__':
14      answer = inchesToCentimeters(10.0)
15      print(answer)
16      answer = inchesToCentimeters(3.0)
17      print(answer)
```

Output:

Evaluate the right hand side of the "="
Call the function inchesToCentimter
Pass the argument 10.0 for the parameter inches

What happens when executes?

inches: 10.0

```
8   def inchesToCentimeters(inches):
9       centi = inches * 2.54
10      return centi
11
12
13  if __name__ == '__main__':
14      answer = inchesToCentimeters(10.0)
15      print(answer)
16      answer = inchesToCentimeters(3.0)
17      print(answer)
```

Output:

Execution moves to line 8 where the definition of function inchesToCentimeters is.
inches has the value 10.0

What happens when executes?

inches: 10.0
centi: 25.4

```
8   def inchesToCentimeters(inches):
9       centi = inches * 2.54
10      return centi
11
12
13  if __name__ == '__main__':
14      answer = inchesToCentimeters(10.0)
15      print(answer)
16      answer = inchesToCentimeters(3.0)
17      print(answer)
```

Output:

The RHS inches * 2.54 is calculated as 25.4.
Then centi is assigned the value 25.4

What happens when executes?

inches: 10.0
centi: 25.4

```
8   def inchesToCentimeters(inches):
9       centi = inches * 2.54
10      return centi
11
12
13  if __name__ == '__main__':
14      answer = 25.4
15      print(answer)
16      answer = inchesToCentimeters(3.0)
17      print(answer)
```

Output:

answer: 25.4

The value of the variable centi (25.4) is returned to the RHS of line 14 where the function was called.

What happens when executes?

```
8  def inchesToCentimeters(inches):
9      centi = inches * 2.54
10     return centi
11
12
13 if __name__ == '__main__':
14     answer = inchesToCentimeters(10.0)
15     print(answer)
16     answer = inchesToCentimeters(3.0)
17     print(answer)
```

Output:

answer: 25.4

answer is assigned the return value 25.4 and line 14 has completed executing

What happens when executes?

```
8  def inchesToCentimeters(inches):
9      centi = inches * 2.54
10     return centi
11
12
13 if __name__ == '__main__':
14     answer = inchesToCentimeters(10.0)
15     print(answer)
16     answer = inchesToCentimeters(3.0)
17     print(answer)
```

Output:

25.4

answer: 25.4

The value of variable answer is printed

What happens when executes?

inches: 3.0

```
8  def inchesToCentimeters(inches):
9      centi = inches * 2.54
10     return centi
11
12
13 if __name__ == '__main__':
14     answer = inchesToCentimeters(10.0)
15     print(answer)
16     answer = inchesToCentimeters(3.0)
17     print(answer)
```

Output:

25.4

answer: 25.4

Evaluate the right hand side of the "="
Pass the argument 3.0 for the parameter inches

What happens when executes?

inches: 3.0

```
8  def inchesToCentimeters(inches):
9      centi = inches * 2.54
10     return centi
11
12
13 if __name__ == '__main__':
14     answer = inchesToCentimeters(10.0)
15     print(answer)
16     answer = inchesToCentimeters(3.0)
17     print(answer)
```

Output:

25.4

answer: 25.4

Execution moves to line 8 where the definition of function inchesToCentimeters is.
inches has the value 3.0

What happens when executes?

```
8   def inchesToCentimeters(inches):
9       centi = inches * 2.54
10      return centi
11
12
13  if __name__ == '__main__':
14      answer = inchesToCentimeters(10.0)
15      print(answer)
16      answer = inchesToCentimeters(3.0)
17      print(answer)
```

inches: 3.0

centi: 7.62

Output:

25.4

answer: 25.4

The RHS inches * 2.54 is calculated as 7.62. Then centi is assigned the value 7.62

What happens when executes?

```
8   def inchesToCentimeters(inches):
9       centi = inches * 2.54
10      return centi
11
12
13  if __name__ == '__main__':
14      answer = inchesToCentimeters(10.0)
15      print(answer)
16      answer =
17      print(answer)
```

inches: 3.0

inches:

centi: 7.62

Output:

25.4

7.62

answer: 25.4

The value of the variable centi (7.62) is returned to the RHS of line 16 where the function was called.

What happens when executes?

```
8   def inchesToCentimeters(inches):
9       centi = inches * 2.54
10      return centi
11
12
13  if __name__ == '__main__':
14      answer = inchesToCentimeters(10.0)
15      print(answer)
16      answer = inchesToCentimeters(3.0)
17      print(answer)
```

Output:

25.4

answer: 7.62

answer is assigned the return value 7.62 and line 16 has completed executing

What happens when executes?

```
8   def inchesToCentimeters(inches):
9       centi = inches * 2.54
10      return centi
11
12
13  if __name__ == '__main__':
14      answer = inchesToCentimeters(10.0)
15      print(answer)
16      answer = inchesToCentimeters(3.0)
17      print(answer)
```

Output:

25.4

7.62

answer: 7.62

The value of variable answer is printed

Let's go see this in Pycharm and add a function

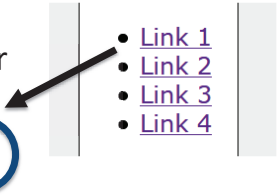
```
def pluralize(word):
    word = word + "es"
    return word

newWord = pluralize("fish")
print(newWord)
word1 = "dress"
word2 = pluralize(word1)
print(word2)
word1 = "book"
print(pluralize(word1))
```

Add this function

Add these lines of code that call the function

WOTO – Working Together (breakout groups)

- **Given a bitly link**
  - Type it in OR click on it on the calendar page
  - http://bit.ly/101s23-0119-1
- **What you should do:**
  - Introduce yourselves
  - Each person fills out google form
  - Put in your name, email and netid
  - Discuss each question and fill out
  - Be mindful of time



WOTO: Calling Functions http://bit.ly/101s23-0119-1

Details: print(addTen(addTen(x)))

```
print(addTen(addTen(x)))
print(addTen(addTen(5)))
print(addTen(15))
print(25)

Output:
25
```

APTs in 101 and 201

- **Algorithm Problem-solving and Testing**
  - Algorithm that's Automatically Tested
  - In use at Duke since 2003, million+ APTs solved
- **Given a problem statement**
  - Read**, think,** plan on **paper** …
  - Write a function to solve the problem
  - Submit the code for testing, debug if necessary
- **Where do you start with problem solving?**

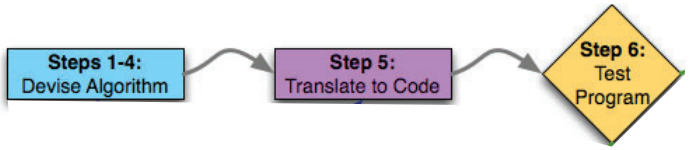
The Seven Steps
Programming Process: High-level

- **First part: devise the algorithm**
  - The meta-problem solving piece
  - Big/complex enough to be 4 steps (more shortly)

The Seven Steps
Programming Process: High-level

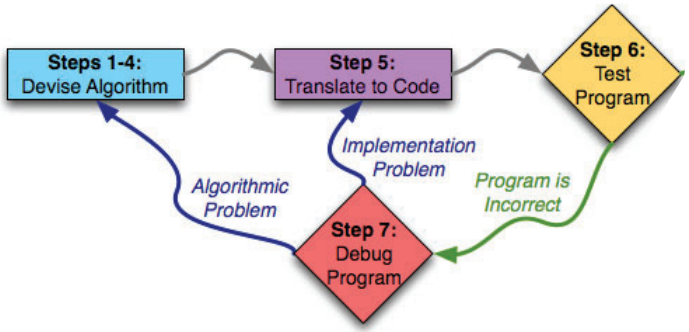
- **After devising the algorithm, translate to code**
  - Plan first, then code
  - Bridge analogy: blue prints, then construction
  - Essay analogy: outline, then prose

The Seven Steps
Programming Process: High-level



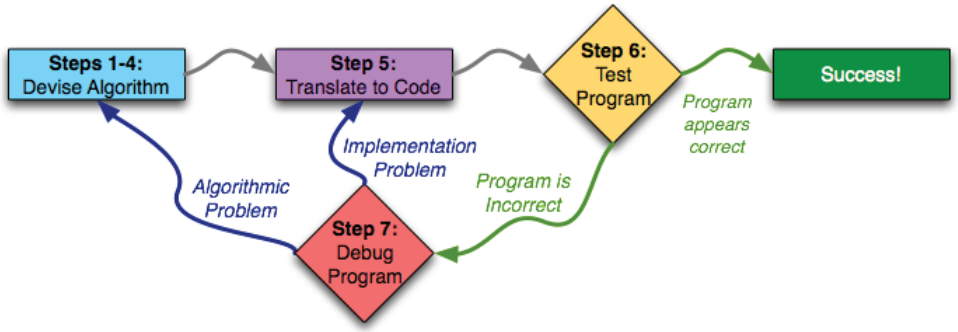
- **Next test our program**
  - Testing important, often under-taught skill

The Seven Steps
Programming Process: High-level



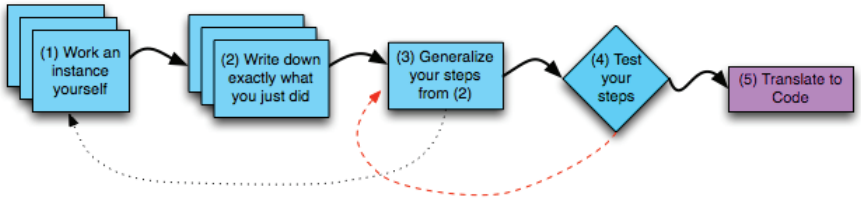
- **Ideally would be correct first time; may need to debug**
  - Identify problem (with science!)
  - Return to appropriate prior step to fix the problem

The Seven Steps
Programming Process: High-level



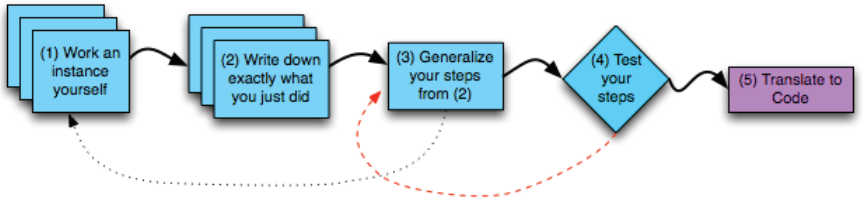
- **Work through cycle until program works**

Steps 1—4: Devise Algorithm

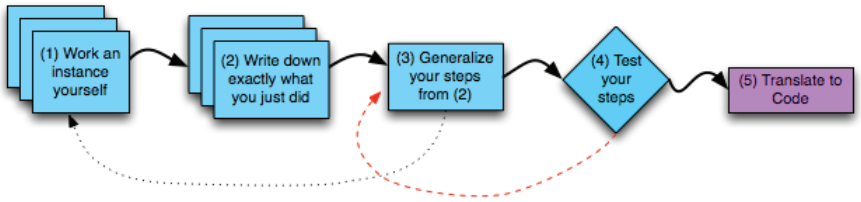


- **Steps 1—4: devise the algorithm**
  - Learn to do this well, be an excellent programmer
  - Language: does not matter

Steps 1—4: Example:
Calculate the average of two numbers

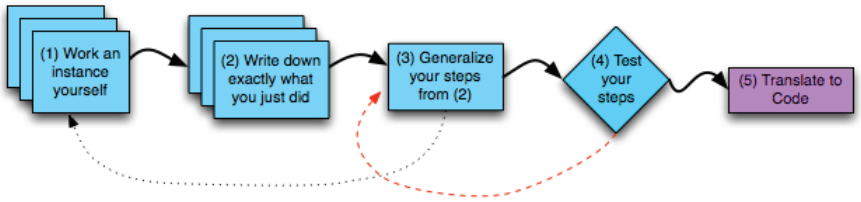


Steps 1—4: Example: Calculate the average of two numbers



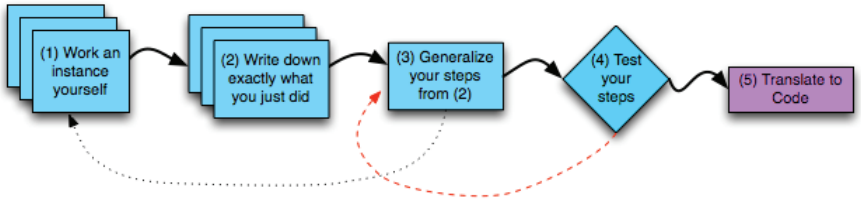
- Step 1: 2 + 5 = 7, 7/2 = 3.5
- Step 2:
  - Add 2 + 5 and get 7
  - Divide 7 by 2 and the result is 3.5

Steps 1—4: Example: Calculate the average of two numbers



- Step 3:
  - Two variables num1 and num2
  - Add the two numbers together:
    result is num1 + num2
  - Divide the result by 2 and you have the answer
    answer is result / 2

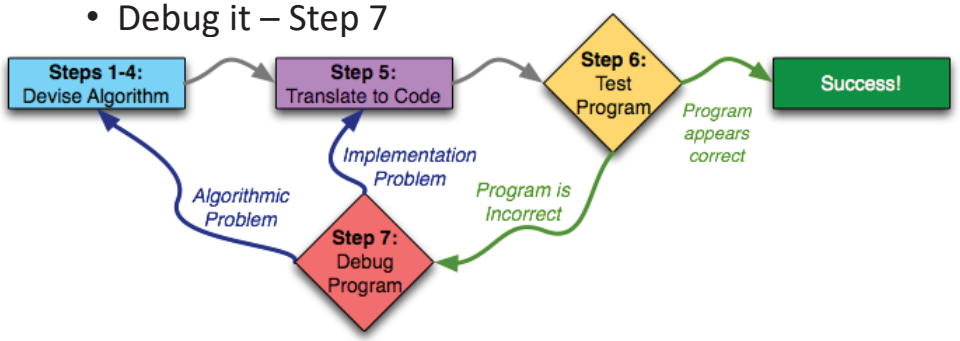
Steps 1—4: Example: Calculate the average of two numbers



- Step 4: Try a different example
  - Use 8 and 6, num1 is 8, num2 is 6
  - Add the two numbers together:
    result is num1 + num2 , is 14
  - Divide the result by 2 and you have the answer
    – Answer is result/2, which is 7
- **IT WORKS!**

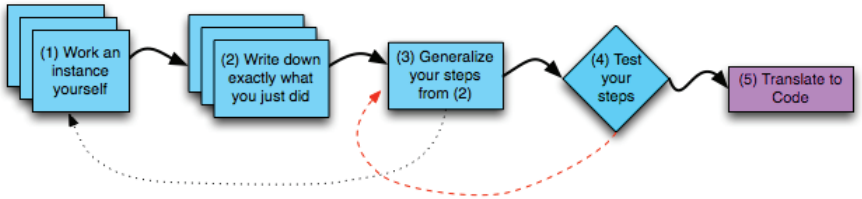
Step 5: let's convert it to code!

- **Go to Pycharm**
- **We will also:**
  - Test it – Step 6
  - Debug it – Step 7

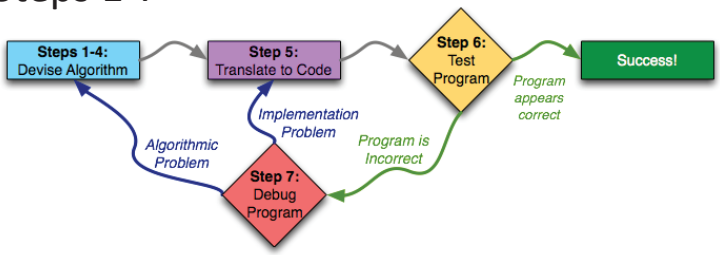


Seven Steps

Steps 1-4



Steps 1-7



Solving Laundry APT

- **Navigate to APTs in class website and …**

CompSci 101, Spring 2023
APTs

Home | About | Dates | Labs | Assign | APTs | Help | Forms | Resources | Sakai

APT Quiz

There will be two APT Quizzes that are just like APTs but are your own work and are timed. quizzes, but not until you are ready to take the quiz.

APTs

See below for hints on what to do if your APT doesn't run.

For each problem in an APT set, complete these steps by the due date

- first click on the APT set below to go to the APT page.
- write the code, upload the file, select the problem, and click the **Submit** link
- **check your grade** on the grade code page by clicking on **check submissions**

In solving APTs, your program should work for all cases, not just the test cases we provide. additional data.

APT	Due Date
APT-1	January 26

Solving Laundry APT

APT Grading: CompSci 101, Spring 2023

This is the webpage for *grading and submitting* your APTs.

Check Grades

check submissions

Problem Set 1	Details
APT-1, Due on January 26, Complete all six of them	
IntroAPT	Do first, explains apts
Bogsquare	
Cone	
Grayscale	
Laundry	in Lecture on 1/19
Gravity	in Lab 1 on 1/20

Test file: Browse... No file selected.

test/run

Solving Laundry APT

- **Navigate to APTs in class website and …**

Problem Statement

Consider the problem of trying to do a number of loads of laundry, given only one washer and one dryer. Washing a load takes 25 minutes, drying a load takes 25 minutes, and folding the clothes in a load takes 10 minutes, for a total of 1 hour per load (assuming that the time to transfer a load is built into the timings given). 10 loads of laundry can be done in 10 hours, 600 minutes, using the method of completing one load before starting the next one. Though it can be done faster, see examples.

Specification

```
filename: Laundry.py

def minutesNeeded(m):
    """
    Return integer number of minutes to launder m (integer) loads
    """

    # you write code here
```

Write the method, `minutesNeeded`, that returns the shortest time needed to do `m` loads of laundry. In other words, given an integer value representing the number of loads to complete, `m`, determine the smallest number of minutes needed to complete all loads of laundry.

Not ready for coding yet!!!!!

Solving Laundry APT – Step 1
WOTO: http://bit.ly/101s23-0119-2

- **What is important info?**

Problem Statement

Consider the problem of trying to do a number of loads of laundry, given only one washer and one dryer. Washing a load takes 25 minutes, drying a load takes 25 minutes, and folding the clothes in a load takes 10 minutes, for a total of 1 hour per load (assuming that the time to transfer a load is built into the timings given). 10 loads of laundry can be done in 10 hours, 600 minutes, using the method of completing one load before starting the next one. Though it can be done faster, see examples.

Specification

```
filename: Laundry.py

def minutesNeeded(m):
    """
    Return integer nunber of minutes to launder m (integer) loads
    """

    # you write code here
```

Write the method, `minutesNeeded`, that returns the shortest time needed to do `m` loads of laundry. In other words, given an integer value representing the number of loads to complete, `m`, determine the smallest number cf minutes needed to complete all loads of laundry.

Solving Laundry APT

- **m = 1**

- **Return: 25 + 25 + 10 = 60 minutes**

Solving Laundry APT

- **m = 2**

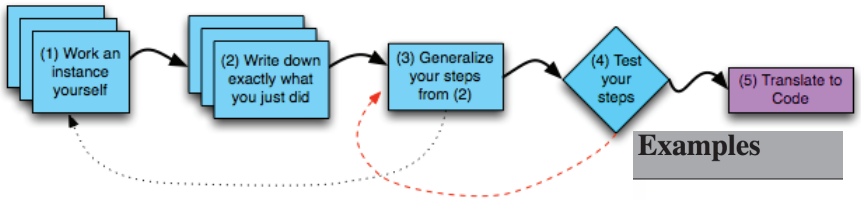
- **Return: 25 + 25 + 25 + 10**

- **= 85 minutes**

Write down what we just did for m=2

- **Washed first load (25 minutes)**
- **Dried first load and washed second load (25 min)**
- **Folded first load dried second load (25 min)**
- **Folded second load (10 min)**
- **Total time was 25 + 25 + 25 +10 = 85 minutes**

Reading an APT



- Step 1: Work an instance yourself
- Step 2: Write down exactly what you just did

What should be a variable?

- Step 3: Generalize your steps
- Step 4: Test your steps (with new input)

Examples

1. `m = 1`

   `returns: 60`

   You must was
   minutes.

2. `m = 2`

   `returns: 85`

Solving Laundry APT – Steps 3 and 4

WOTO: http://bit.ly/101s23-0119-3

- **What is important info?**

Problem Statement

Consider the problem of trying to do a number of loads of laundry, given only one washer and one dryer. Washing a load takes 25 minutes, drying a load takes 25 minutes, and folding the clothes in a load takes 10 minutes, for a total of 1 hour per load (assuming that the time to transfer a load is built into the timings given). 10 loads of laundry can be done in 10 hours, 600 minutes, using the method of completing one load before starting the next one. Though it can be done faster, see examples.

Specification

```
filename: Laundry.py

def minutesNeeded(m):
    """
    Return integer number of minutes to launder m (integer) loads
    """

    # you write code here
```

Write the method, `minutesNeeded`, that returns the shortest time needed to do `m` loads of laundry. In other words, given an integer value representing the number of loads to complete, `m`, determine the smallest number of minutes needed to complete all loads of laundry.

Solving an APT

- **Create new project**
  - File > New Project
  - Existing interpreter (first project you made from installation)
- **Create new Python File**
  - Right click on project > New > Python File
- **Create function within module**
  - Name it properly!

Names and Return 0 Submission

- **Take small steps to get all green!**

Test Results Follow (scroll to see all)

# of correct: 0 out of 19

1	fail
2	fail
3	fail
4	fail
5	fail
6	fail
7	fail
8	fail
9	fail
10	fail
11	fail
12	fail
13	fail
14	fail
15	fail
16	fail
17	fail
18	fail
19	fail

Test Results Follow (scroll to see all)

# of correct: 12 out of 19

1	pass
2	pass
3	pass
4	pass
5	pass
6	pass
7	pass
8	pass
9	pass
10	pass
11	pass
12	pass
13	fail
14	fail
15	fail
16	fail
17	fail
18	fail
19	fail

Test Results Follow (scroll to see all)

# of correct: 19 out of 19

1	pass
2	pass
3	pass
4	pass
5	pass
6	pass
7	pass
8	pass
9	pass
10	pass
11	pass
12	pass
13	pass
14	pass
15	pass
16	pass
17	pass
18	pass
19	pass

APT Correct → The Green Dance(Fall 2020)