Model 1 Flow of Execution

In addition to using Python's built-in functions (e.g., `print`, `abs`) and functions defined in other modules (e.g., `math.sqrt`), you can write your own functions.

```
1  def model_one():
2      word = input("Enter a word: ")
3      L = len(word)
4      ans = word * L
5      print(ans)
6
7  def main():
8      print("Starting main...")
9      model_one()
10     print("All done!")
11
12 main()
```

Questions (20 min)

Start time: _____

1. Based on the program in Model 1:

a) What is the Python keyword for defining a function? _____

b) On what line is the `model_one` function... defined? _____ called? _____

c) On what line is the `main` function... defined? _____ called? _____

2. Open a web browser and go to PythonTutor.com. Click on "Visualize your code", and type (or paste) the program above. Make sure the line numbers match.

3. Click the "Visualize Execution" button. As you step through the program, pay attention to what is happening on the **left side** of the visualization.

a) What does the **red** arrow indicate? _____

b) What does the **green** arrow indicate? _____

4. Notice the order in which the program runs:

a) After line 12 of the program executes (Step 3), what is the next line that executes? _____

b) After line 9 of the program executes (Step 6), what is the next line that executes? _____

5. Go back to the beginning of the program execution. This time as you step through the program, pay attention to what changes on the **right side** of the visualization.

a) Describe what changes in the visualization after Step 1.

b) Describe what changes in the visualization after Step 2.

6. In general, what happens on the right side of the visualization when a function is called?

7. In terms of execution order, what is the effect of calling a function?

8. Draw the right side of the visualization for Step 11 in the space below.

9. Notice that the variable `ans` is printed from within the `model_one` function. What happens if you try to `print(ans)` inside the main function?

10. Explain what happened in the previous question in terms of frames in the visualization.

11. In the space below, define a function named `squared` that prompts the user to enter an integer. Then, the function should print the square of that integer.

12. Edit the program in Python Tutor so that, instead of defining and calling the function `model_one`, it defines and calls the function `squared`. Verify your changes by visualizing the execution, and draw a picture of the right side immediately after the square is printed.