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Unit 1 / Lesson 1 / Assignment 3

Start Thinking Like a Coder

Estimated Time: 1-2 hours

In the previous assignment we saw how we can enter instructions into the Python interpreter and have them calculated one after another. This idea forms the basis of all computer programs: everything from Facebook, to the ABS in your car, to Python itself, just consist of a series of instructions which the computer follows in order.

A set of instructions which solve a specific problem is called an **algorithm**. In this assignment you are going to run through a couple of warmup exercises to get you thinking about how algorithms work, and how they can be used to solve problems. You will be:

- Working through an algorithm to try to find out what action it performs
- Writing out a set of instructions to play the FizzBuzz game

Rather than using actual Python code in these exercises we are going to use readable text so we can concentrate on the details of the algorithms. You should work on these exercises on pen and paper. This is a really useful way to work out what some code is doing, or make initial plans for tackling a problem.

Algorithm #1

Here is an algorithm to perform a common computing task. Try to work through the instructions on paper, using the following list as a starting point: [2, 7, 3, 9, 2]. What does the algorithm do?

1. Imagine you have a list of numbers.
2. Start a counter at zero.
3. Look at the first two numbers.
4. If the first number is greater than the second, then swap the numbers and increase the counter by one.
5. Repeat steps 3 and 4 for the second and third numbers, then the third and fourth, and so on until you reach the end of the list.
6. If your counter is zero, then you have finished. If it is not zero then go back to step 2.

To get you started here are the first few steps of the algorithm:

```
2, 7, 3, 9, 2 (Initial state.  Swaps = 0)
2, 7, 3, 9, 2 (Don't swap 2 and 7.  Swaps = 0)
2, 3, 7, 9, 2 (Swap 7 and 3.  Swaps = 1)
```

Once you are done check your work against this example solution.

Algorithm #2

Try to write out a set of simple instructions which describe the FizzBuzz game. At the end of this lesson we will be revisiting FizzBuzz and writing some Python code which will play the game.

Compare your instructions to these example instructions. Do you notice any differences between your solution and the example? Is one clearer or more

precise than the other?

Extension exercise

If you found those two exercises fairly straightforward then you should have a go at trying to write out some simple instructions to solve the following problem in as few guesses as possible:

I'm thinking of a number between 0 and 100. Try to write an algorithm which will find out what number I'm thinking of. You can have as many guesses as you like, and after each guess I'll tell you whether you were too high, or too low.

Hint: Try to think about what the optimal first guess would be to narrow the problem down. Then what would your second guess be?

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