CS-521 Homework Assignment 1

Answer the following 10 questions (and subparts) using information you find in the reading, lecture, and study guide for this week. You can use the textbook’s exact text for your answers, but be sure to mark these with some indicator such as [text] to indicate you are quoting the textbook. Your answers should be short, clear, and reasonably complete.

## Question 1

Python is an **interpreted** language.

1. What does “interpreted” mean in this context?  
   [text] “…there is a program within Python called the interpreter that takes each line of Python code, one line at a time, and executes that code.”
2. What are some advantages and disadvantages of using an interpreted language vs. a compiled language?

Being an interpreted language allows coders to attempt lines of code one line at a time by typing into the Python shell. This is beneficial for learning a new language as it gives quick feedback to the programmer to understand the output of their code. [text]

In a compiled language like C, it is possible to have forward-referencing, where you can reference some function that is defined later. This is due to the compiler looking at the file twice. They tend to be more efficient compared to interpreted languages. Compiled languages require an additional step, being “built” or manually compiled.

## Question 2

For storing data, Python uses specific data types for each variable.

1. What does being a dynamically-typed language mean?

A dynamically-typed language is one which has the interpreter assign variables a type depending on the variable’s value.

1. What is the difference between a *primitive* and a *collection* data type?

Primitive data types are the foundation of Python.[text] Every type is considered an object with its own ID number. Every object has its own attributes associated with it, telling us something about its “content”. Each type also has its own operations, or actions that can be done with that object. A collection type contains multiple objects organized as a single object type.

1. What are the *primitive* and *collection* data types in Python?

Primitive: Integer, float, character, Boolean, complex number

Collection: Set, dictionary, tuple, list, string

## Question 3

When we import libraries and modules from other places into a Python program, we use the **import** keyword. Imagine we have a library called foo that has a module called spam we want to use.

What is the difference between import foo and from foo import spam?

The first import foo imports the entire foo module, including any additional functions that it may contain. We would reference the spam function through foo. The import from foo import spam

Imports only the spam function from that module, and it can be directly referenced.

## Question 4

Regarding **whitespace** in Python:

1. What is whitespace? Include examples.  
   Whitespace refers to the indentation or spaces at the beginning of a code line.

One example from lecture notes:

for e in x\_list :

y\_sum = y\_sum + e

y\_list.append(y\_sum)

Notice that the two lines within the for loop are indented.

1. When does whitespace matter?  
   Whitespace matters at the beginning of a line. If you want a line of code grouped within a loop, for example, it must be indented within that block to indicate it is within the loop.
2. When does whitespace not matter?  
   Python doesn’t care about whitespace within a code block such as in a list, within parentheses, around operators, or at the end of a line.

## Question 5

Regarding Python **statements** and **expressions**:

1. What is the difference between a statement and an expression?  
   An expression returns a value, a statement does not.
2. What is an example of a statement and an example of an expression?  
   fruit = “banana” # statement, no return value

fruit + “ apple” # expression, value associated with fruit is concatenated with “ apple” and returned

1. What is meant by a statement having a **side effect**?   
   [text] some change that results from executing the statement

For example, we have written the statement

fruit = “banana”

After this variable assignment, if we type the variable *fruit* into the Python shell, we see the value of *fruit* because it now holds value.

## Question 6

Thinking about mixed operations in Python:

1. What data type results when you divide an integer by a float?  
   float
2. What data type results when you divide a float by an integer?  
   float
3. Why do the resulting data type(s) answered above make sense, as opposed to other data types?   
   A float type is expected because Python produces the general numeric type without losing precision, and in this case that is a float instead of an integer.

## Question 7

Consider this Python program:

*if* x *>* 30:

print("Big!")

*else*:

print("Small!")

If we run this code and the value of x is 20, what will be printed? What will be printed if x is 40?

If 20, Small!

If 40, Big!

## Question 8

If I’m writing a Python program, can I create variables named if or else? If not, why not?

No, because those are reserved keywords in Python which indicated commands to the interpreter.

## Question 9

Consider the following 3-line Python program:

my\_var1 = 13.0  
my\_var2 = 4  
print(my\_var1 % \

my\_var2)

Open your copy of Spyder IDE (or the IDE you’re using) and copy the above program into it.

1. If you run this program, what output is generated?  
   1.0
2. What data type is the output? Why?  
   float, [text] “Most languages, including Python, when presented with mixed types will ‘promote’ an integer to be a floating point so that both operands are floats and the operation can be performed as floats.”
3. What does the \ character at the end of line 3 do?  
   It is a line continuation character, indicating to the interpreter that line 3 continues onto the next line instead of resulting in an error.

## Question 10

Open your copy of Spyder IDE (or the IDE you’re using). In the IDE, create a new Python script and copy the following lines of code, substituting your name where indicated in the comment. *NB: If you are using Spyder, you may have some default comment lines at the top of the file.* ***You do not need to delete these*** *— it’s fine to leave them in place!*

# CS521 Assignment 1 - <Your Name Here>

my\_int = 4 + 3 \* 3

my\_int = my\_int + 5

print(my\_int)

Once you have copied the code, run the script, and then answer the questions below.

1. What output does the script generate?  
   18
2. What data type is the variable my\_int? When is this data type assigned to it?  
   int, the data type is assigned when the line my\_int = 4 + 3 \* 3 has been evaluated by the interpreter
3. Rewrite the **second** line of the code (my\_int = my\_int + 5) using the += operator instead. Once finished, run your script again. **Does the output change? If so, what is the new value?**

my\_int += 5 The output doesn’t change.   
The question is a bit vague if the += operator should remove the unnecessary my\_int on the righthand side of the line.

my\_int += my\_int + 5, in which case yes it would be 31 for output (but I’m not sure that is the intent)

When you have finished, **save this new script** as a file named yourname\_assignment1.py. (Ex.: janedoe\_assignment1.py).

# Submitting your assignment

1. Save the document containing your answers to these questions as a document named yourname\_assignment1\_answers.docx (Ex.: janedoe\_assignment1\_answers.docx)[[1]](#footnote-1).  
   **Note: If you are using an online editor such as Google Docs**, you **must** save your work as a separate file — you may not submit a link to a Google Doc! To do this, click **File**, then **Download** and select **Microsoft Word** format.
2. Create a zip file containing **both** your answers document **and** your Python script from question 10. (The resulting zip file should have two files in it — your answers, and your .py script.) This zip file should be named <your\_email\_prefix>\_hw\_1.zip. (Ex.: jdoe\_hw\_1.zip)
3. In Blackboard, click **Assignments** in the Navigation pane (on the left side) and then click on **Homework Problems 1**. Attach the zip file and click **Submit** to submit your assignment.

1. Your file may have a different extension if you are using a different program to write your answers. [↑](#footnote-ref-1)