

22C:16 Practice Problem Set 5

Morning Section: Complete before Tuesday, 3-5-2013

Evening Section: Complete before Monday, 3-4-2013

These practice problems correspond roughly to the material on keyword arguments, keyword parameters, and local and global variables. This material was covered on Wednesday 2/20 and Monday 2/25.

1. Consider the following function definition.

```
def test(a, b = 15, c = 20, d = "12"):  
    return str(b) + str(c) + d + a
```

For each of the function calls below, first write down if the function call causes an error or not. If you determine that the the function call does cause an error, write down a 1-sentence explanation as to why this is so. If you determine that the function call does not cause an error, then write down (i) the values that the parameters of `test` take on and (ii) the value that is returned by the function.

- (a) `test()`
 - (b) `test(10)`
 - (c) `test("30", 20, c = 50)`
 - (d) `test(b = 40, a = str(40))`
 - (e) `test("hello", 1, d = "2")`
2. Consider the following function definition.

```
def test(a, b = "15", c = 20):  
    d = a + a  
    return b + str(c) + str(d)
```

For each of the function calls below, first write down if the function call causes an error or not. If you determine that the the function call does cause an error, write down a 1-sentence explanation as to why this is so. If you determine that the function call does not cause an error, then write down (i) the values that the parameters of `test` take on and (ii) the value that is returned by the function.

- (a) `test(20, c = 50)`
- (b) `test(10)`
- (c) `test(str(30), c = 50)`
- (d) `test(d = 40, a = str(40))`
- (e) `test("hello", "bye")`

3. Consider the following program

```
def foo(x):
    global z
    z = 22
    y = 15
    return x + y - z

x = 10
y = 15
z = 11
y = foo(z - x)
print x + y - z
```

- (a) What is the output of this program when it is executed.
- (b) Now delete the `global z` statement from the function `foo`. What is the output of this modified program when it is executed?

4. Consider the following program

```
def foo(x):
    global z
    z = 5
    return x + y - z

x = 10
y = 15
z = 11
y = foo(10)
print x + y - z
```

- (a) What is the output of this program when it is executed.
- (b) Now delete the `global z` statement from the function `foo`. What is the output of this modified program when it is executed?

5. Consider the following program:

```
def hotpoLength(n):
    count = 0
    while n > 1:
        if n % 2 == 0:
            n = n/2
        else:
            n = 3*n + 1

        count = count + 1

    return count

# Main program
m = 100
while m <= 200:
    print m, hotpoLength(m)
    m = m + 1
```

This program contains the familiar `hotpoLength` function. This function is called by the main program to produce a list of numbers between 100 and 200 (inclusive of both endpoints) and their hotpo lengths. Note that communication between the main program and the function is happening via the argument `m` (in the main program) and the parameter `n` (in the function header).

Make changes to the function `hotpoLength` so that it has zero parameters and is receiving information from the main program via the use of a global variable. This is a terrible idea in general and you are herewith forbidden to use global variables as a means of communication between parts of your programs. However, this exercise will help strengthen your understanding of global variables and communication between parts of a Python program.
