

## SI@UCF Introduction to Programming in Python

### Test #2 Solution

July 21, 2014

1) (15 pts) What is the output of the following segment of code?

```
str = "ABCDEFGHJIJ"  
print(str[2:7])  
print(str[:8])  
print(str[3:])  
print(str[-6:-2])  
print(str[:-5])
```

CDEFG

ABCDEFGH

DEFGHIJ

EFGH

ABCDE (Grading: 3 pts each, 2 pts if off by 1, 1 pt if off on both ends)

2) (15 pts) What is the output of the following segment of code? Note that the output is not unique, since sets can be listed in any order. Any valid answer will be counted as correct.

```
listx = [2,3,5,6,8]  
listy = [2,3,4,7]  
x = set(listx)  
y = set(listy)  
print(x & y)  
print(x | y)  
print(x ^ y)  
print(x - y)  
print(y - x)
```

{2, 3}

{2, 3, 4, 5, 6, 7, 8}

{4, 5, 6, 7, 8}

{8, 5, 6}

{4, 7}

(Grading: 3 pts each, give 2 pts if off by 1 number, 1 pt if off by 2 numbers)

3) (15 pts) Create an empty dictionary that maps people to the college they attended. Add the information that “Barack” attended “Columbia” and that “Mitt” attended “Brigham Young”. Finally, ask the user to enter their name and college and add this to the dictionary.

```
listcol = {} # 2 pt  
listcol["Barack"] = "Columbia" # 3 pts  
listcol["Mitt"] = "Brigham Young" # 3 pts  
name = input("What is your name?\n") # 2 pt  
college = input("What college did you attend?\n") # 2 pt  
listcol[name] = college # 3 pts
```

4) (15 pts) Write a segment of code to ask the user to enter a name. Then, if the name is in the dictionary from question #3, respond with the college the person whose name was entered went to. If that entry is not in the dictionary, print out a message saying that that person's college is unknown.

```
name = input("Please enter a name.\n")  
if name in listcol:  
    print(name+" went to "+listcol[name])  
else:  
    print("We don't know where "+name+" went to college.")
```

Grading: 3 pts read, 3 pts if, 4 pts print, 1 pt else, 4 pts other print

5) (15 pts) A perfect number is a number whose sum of proper divisors is equal to the number itself. For example, 6 is a perfect number since all of the numbers that divide into it that are less than it add to 6:  $1 + 2 + 3 = 6$ . A second example of a perfect number is 28, since  $1 + 2 + 4 + 7 + 14 = 28$ . Write a program that prints out all of the perfect numbers less than 10000. (Note: On the off hand chance that you have these memorized, please don't just write print statements to print these out. You won't get credit for doing so. Please solve this the intended way, with loops that check each number from 1 to 10000 for the desired property.)

```
def main() :  
  
    for num in range(1,10001) :  
  
        total = 0  
        for i in range(1,num) :  
            if num%i == 0:  
                total += i  
        if total == num:  
            print(num)
```

main()

6) (9 pts) Roughly how many times is the code segment below going to print "Go Knights! "? Give some proof for your answer.

```
n = 1000000  
while n > 0:  
    print("Go Knights!")  
    n = n//2
```

This runs roughly 20 times. Each time, n is getting divided by 2, until it reaches 0. This is the same as starting at 1 and multiplying by 2 until reaching a million. Since  $2^{20}$  is slightly more than a million, we can ascertain that this runs either 20 or 21 times.

Grading: 5 pts for being in the right ballpark, 4 pts for the reasoning

7) (15 pts) A simple formula for the height of an object dropped from Y feet high t seconds after its dropped (on Earth) is  $f(t) = Y - 16t^2$ . Fill in the program below so that it prints out a chart of the height of an object after each second, starting with  $t = 0$ . The user will enter the initial height. The last line should print a height of 0, regardless of what the mathematical equation says, since the object won't fall below the ground.

```
def main():  
  
    height = int(input("Enter the initial height.\n"))  
    t = 0;  
  
    saveheight = height                                # 3 pts  
  
    print("Time\tHeight")  
    while height > 0:  
  
        print(t, "\t", height)  
        t = t + 1                                        # 4 pts  
        height = saveheight - 16*t*t                    # 5 pts  
  
    print(t, "\t", 0)                                    # 3 pts
```

```
main()
```

8) (1 pt) In what shape are the individual pieces of the popular cereal Froot Loops?

Loops

**Scratch Page – Please clearly mark any work on this page you would like graded.**