

Fall 2020 COP 2930 Midterm Exam Part C Solution

Date: 10/11/2020

Time Given: 9:45 pm

Time Due: 10:30 pm

Late Due Time: 10:40 pm

1) (12 pts) A pond starts with some number of algae on day 1. If there are n algae on a particular day, then there will be $2n-3$ algae on the next day. Write a program where you ask the user how many algae there were on day 1, and how many days to print the chart, and print a chart where each row shows the day number and the number of algae in the pool on that day. For example, if the user enters that there are 5 algae on day 1 and to print the chart for 6 days, your program should produce the following output.

Day	Algae
1	5
2	7
3	11
4	19
5	35
6	67

For each line, please place a single tab (`\t`) between the two items printed.

Sample Solution

```
numAlgae = int(input("How many algae on day 1?\n"))
numDays = int(input("How many days for the chart?\n"))

print("Day\tAlgae")
for day in range(1, numDays+1):
    print(day,numAlgae, sep="\t")
    numAlgae = 2*numAlgae - 3
```

Grading: 3 pts for input

0 pts chart header (ok if they forgot this, not what I am testing)

3 pts loop (1 pt for, 1 pt index, 1 pts for range)

3 pts print(1 pt day, 1 pt algae, 1 pt tab separation)

3 pts algae update

2) (20 pts) Consider printing out a sideways pyramid that is right-justified, using a **nested loop structure**. At the beginning of your program ask the user to enter the height of your pyramid. Use this number to generate a pyramid using the '*' character. (An example is shown below so that you understand the structure of what to print. **Please do NOT use Python's feature of multiplying a string by a number.** Instead, please write your program using nested loops in some fashion where each individual print statement prints at most one character. *Minimal credit will be given for solutions that are correct but don't adhere to these directions!*

Here is what your program should print if the user enters $n = 4$:

```

      *
     **
    ***
   ****
  ***
 ***
**
 *
```

Note that we say the height is 4 because the width of the picture is 4. (The pyramid is sideways, so the ground is the vertical right edge of the picture.) The width of this pyramid is 7 (which means we print 7 rows), and in general, the width of a pyramid of height n is $2n-1$.

Sample Solution

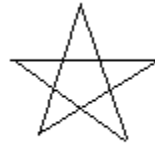
```
n = int(input("How tall is your pyramid?\n"))
```

```
spaces = n-1
for stars in range(1,n+1):
    for i in range(spaces):
        print(" ", end="")
    for i in range(stars):
        print("*", end="")
    print()
    spaces -= 1
stars = n-1
for spaces in range(1, n):
    for i in range(spaces):
        print(" ", end="")
    for i in range(stars):
        print("*", end="")
    print()
    stars -= 1
```

Grading: 2 pts input, 9 pts first n lines, 9 pts last n lines

**9 pt breakdown: 1 pt outer loop, 1 for inner space loop, 1 pt inner star loop
2 pts # space calculation, 2 pts # star calculation, 1 pt end
1 pt print new line**

3) (15 pts) For this question, use the Python Turtle to draw a five pointed star **using a loop** that looks roughly like this:



Please make each side length 100 pixels. Also, note that the angle at each of the five points of the star is 36 degrees and this picture is made up of five line segments, each of length 100 pixels. **DO NOT HARD CODE SEPARATE forward statements to draw each of the five line segments!** Please use a single loop with two statements in it. *Minimal credit will be given for solutions that are correct but don't adhere to these directions!*

Here are relevant turtle commands:

```
turtle.forward(d) # Moves turtle forward d pixels.  
turtle.left(angle) # Turns turtle left by angle.  
turtle.right(angle) # Turns turtle right by angle.
```

Sample Solution

```
for i in range(5):  
    turtle.forward(100)  
    turtle.right(180-36)
```

Grading: 3 pts loop, 6 pts forward, 6 pts turn

4) (3 pts) What food item can you order at Tin and Taco? **Tacos** (Grading: Give to all)