

SI@UCF Introduction to Programming in Python Test #2 Solutions

1) (15 pts) Write a complete python program that asks the user to enter in the height, width and length of a rectangular prism (box) and prints out the surface area of the rectangular prism.

Solution

```
height = int(input("What is the height of your box?\n"))
width = int(input("What is the length of your box?\n"))
length = int(input("What is the length of our box?\n"))

print("SA =", 2*(height*width+height*length+width*length))
```

Grading: 6 pts input statements (2 pts vars, 2 pts int, 2 pts input), 8 pts formula for SA, 1 pt print)

2) (15 pts) Steve and Mary's sells college apparel. The first 10 items you buy cost \$10 each and any item after the 10th costs \$6 each. Thus, if you buy 6 items you would spend \$60 and if you buy 12 items you would spend \$112. Write a complete python program that asks the user to enter the number of items they bought and prints out the total cost of the purchase.

Solution

```
n = int(input("How many items are you buying?\n"))

if n <= 10:
    print("Your cost is $", 10*n, sep="")
else:
    print("Your cost is $", 100+6*(n-10), sep="")
```

Grading: 3 pts input stmt, 3 pts if, 3 pts formula <= 10, 5 pts formula > 10, 1 pt print

3) (8 pts) What is the output of the following segment of code in python? (Note: you should have 10 numbers separated by spaces all on one line.

```
start = 3
for i in range(8):
    print(start, end=" ")
    start = 2*start - 2
```

Solution

3 4 6 10 18 34 66 130

Grading: 1 pt per value

4) (20 pts) Write a complete program that prints out a star design similar to that of the American flag. Your program should ask the user for the number of stars in the first row and the number of rows. For example, a design with 9 stars on the first row with 5 rows should print out as follows:

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

Solution

```
n = int(input("How many stars on the first row?\n"))
numrows = int(input("How many rows of stars?\n"))
```

```
for i in range(numrows):

    toprint = n
    if i%2 == 1:
        toprint = n-1
        print(" ", end="")

    for j in range(toprint):
        print("*", end=" ")
    print()
```

Grading: 4 pts input, 3 pts outer loop, 6 pts even rows, 6 pts odd rows, 1 pt newlines

5) (20 pts) Consider writing a pygame program that moves a dot every 100 frames to different random location on the screen. Also, when moving the dot, a new random color is chosen for the dot. In choosing a random location, any location is equally likely so long as the full dot appears within the screen. (Note: You can achieve this randomness by separately picking a valid random x value from the possible valid x values and picking a valid random y value from the possible valid y values for the top left corner of the dot.) Complete the framework below to achieve this task.

```
import pygame, sys
from pygame.locals import *
import random
WIDTH = 1000
HEIGHT = 600
RADIUS = 75
black = pygame.Color(0,0,0)
pygame.init()
DISPLAYSURF = pygame.display.set_mode((WIDTH, HEIGHT))
pygame.display.set_caption("Test 2 Question 5!")
x = -1
y = -1
clr = pygame.Color(255,0,0)
clock = pygame.time.Clock()
frameCnt = 0

while True:

    for event in pygame.event.get():
        if event.type == QUIT:
            pygame.quit()
            sys.exit()

    if frameCnt%100 == 0: # 3 pts

        x = RADIUS + random.randint(0, WIDTH-2*RADIUS) # 4 pts

        y = RADIUS + random.randint(0, HEIGHT-2*RADIUS) # 4 pts

        clr = pygame.Color(random.randint(0, 255), # 3 pts
                random.randint(0, 255), random.randint(0, 255))

    DISPLAYSURF.fill(black)

    pygame.draw.circle(DISPLAYSURF, clr, (x,y), RADIUS, 0) #5pts

    frameCnt += 1 # 1 pt
    pygame.display.update()
    clock.tick(50)
```

6) (10 pts) You are considering creating a website UCFCODE which hosts programming contests. Each participant will have an integer rating and a number of contests in which they participate. Their score from an individual contest will be an integer in between 0 and 1000, inclusive. To adjust a participant's rating after a contest, you plan on using the following formula:

$$newscore = \text{int}\left(\frac{oldscore \times n + 3 \times thisscore}{n + 3}\right)$$

where *oldscore* is their previous score and *n* is the number of previous contests and int represents truncation. Currently, the data is stored in two dictionaries, one which maps the user handle (string of lowercase letters) to their score, and the other which maps the user handle to the number of contests they've participated in. Let the names of these two dictionaries be *scores* and *numcontests*, respectively. Assume that that these are currently filled with all valid users and that you want to **update a particular participant's score and number of contests**. Complete the code segment below to do so. You may assume that the handle entered by the user exists in both dictionaries and you may declare new variables as you see fit. Please use *scores* and *numcontests* appropriately, though.

```
handle = input("What is your handle?\n")
thisscore = int(input("What did you get last contest?\n"))
```

Solution

```
n = numcontests[handle]
scores[handle] = (scores[handle]*n + 3*thisscore)//(n+3)
numcontests[handle] = numcontests[handle] + 1
```

**Grading: 1 pts for RHS scores[handle], 5 pts for LHS of scores[handle] assignment,
1 pts for RHS numcontests[handle], 3 pts for LHS of that assignment**

7) (11 pts) Complete the function below that takes in two lists (of integers) and creates a new list by interleaving the items in the input lists. For example, if *list1* contained 3, 2, 3, 8 (in that order) and *list2* contained 4, 9, 9, and 4, then you should create a list with the contents 3, 4, 2, 9, 3, 9, 8 and 4, in that order and return it. **You may assume that both lists are non-empty and contain the same number of values. Also, please take the first item from list1 as shown in the example above.**

```
def interleave(list1, list2):  
    res = []  
    for i in range(len(list1)) :  
        res.append(list1[i])  
        res.append(list2[i])  
    return res
```

Grading: 3 pts loop, 4 pts for both appends.

8) (1 pt) After which great artist is the Teenage Mutant Ninja Turtle Leonardo named? (Hint: this artist painted The Last Supper.)

Leonardo Da Vinci (Grading: give to all)