CSCI-UA 2
Introduction to Computer Programming

Midterm Review Session 2

Question 1

Evaluate the following expressions and indicate the data type of the result.

1.

```
len('60FA') % 2
```

2.

```
(20 >= (5 * 4)) and (False or True)
```

3.

```
str(8 ** 2) + '5'
```

4.

```
f'{11 % 2:.1f}'
```

Question 2

Using the following string assigned to the variable, “numbers” write a Python program to determine the percentage of all numbers in the string that are evenly divisible by three.

Here is the expected output.

```
Out of 500 numbers, 38.0% are evenly divisible by three.
```

Here is the string to use in your program.

```
numbers = "74562999924556366242224641612878793492635892195 9
93244438373422939457542981943722367393666319193578141522741
14928242868494953497454998645215391114394394461628934486629
65617668473816469556993636187132775981233792218971573943886
83769253686694596797398322839927632696772588698572692423535
48211156292237247575283785327357679232187238199963895578289
58642996737748539929698929515632351976899169862591775874497
71347969821476661854833818615561159173931835723533841981159
34139798645254216141668718748911558238 5"
```

Question 3

Trace the output of the following programs.

1.

```
def fun1():
    print("hi!")

def fun2():
    print("bye!")

if 10 < 5 or 5 > 6:
    fun1()
    fun2()
else:
    fun2()
    fun1()
```

2.

```
def fun(a):
    print("a =", a)

for x in range(5):
    fun(x)
```

3.

```
def fun2(a):
    print(a + 100)

c = 5

while c < 10:
    fun2(c)
    c += 1
```

4.

```
def fun(a, b):
    c = a ** b
    return c

for x in range(2, 4):
    for y in range(2, 4):
        print(x, y, fun(x,y))
```

5.

```
a = 1

def f1(b):
    global a

    x = b * a
    a += 1

    return '*' * x

for y in range(5):
    print(f1(y))
```

6.

```
def x(y):
    print(y)
    y += 1
    z(y)
    print("ok")

def z(y):
    print(y)

x(5)
```

7.

```
def f1(a):
    if a < 0:
        return 0
    elif a < 2:
        return 1
    elif a < 4:
        return 2
    else:
        return 3

for x in range(5):
    print('*' * f1(x))
```

Question 4

What will be the output of the following program?

```
for foo in range(24, 16, -4):
    for bar in range(5, 15, 7):
        print(foo, bar, sep='#', end='*')
    print()
```

Question 5, Part 1

Write a function to calculate the discount on a purchase of coffee beans for a café.

The coffee beans sell for $20/pound. Quantity discounts are given as follows:

Quantity	Discount
1–9 pounds	none
10–19 pounds	10%
20–49 pounds	20%
50 or more	30%

Your function should accept the number of pounds of coffee purchased as an argument and return the total cost after the discount.

Note: You are not writing a full program for this question—you will do that in the next question. Just write the function as specified.

Question 5, Part 2

Using a `main()` function, write a program that prompts the user for the number of pounds of coffee that the café would like to purchase from the supplier. The user can only enter values greater than zero—anything less should cause the program to prompt the user again for a positive number.

Utilize the discount function you wrote for the previous question and generate output as in the following example.

```
How many pounds of coffee would you like to purchase? 0
Please enter a number greater than 0: 24
Original cost: $480.00
Discounted cost: $384.00
Thanks for your order!
```

Question 6

What will be the output of the following program?

```
def delta(x):
    x = str(x % 2)
    return x

alpha = 0
beta = 3
gamma = ''

for i in range(beta, alpha, -1):
    for j in range(beta):
        gamma += delta(i) * j

print(gamma)
```

Question 7

Complete the following "bird watcher" program, which prompts the user to enter in the number of birds that they spotted on a given day. The user can enter in values for an unlimited number of days. They can elect to stop entering data by indicating that they saw 0 birds on a particular day.

When finished gathering data the program should display the number of birds seen, the number of days that the user watched birds, as well as the average number of birds seen per day. Here's a sample running of the program.

```
How many birds today (0 to end)? 10
How many birds today (0 to end)? 5
How many birds today (0 to end)? 15
How many birds today (0 to end)? 0

You watched birds for 3 days
In total you saw 30 birds
That's an average of 10.0 per day
```

Fill in the blank lines of the program.

```
# Bird Watching

total_days = 0
total_birds = 0

birds = int(input('How many birds today (0 to end)? '))


_____________________________________________________________________
    total_days += 1
    total_birds += birds
    birds = int(input('How many birds today (0 to end)? '))


_____________________________________________________________________

print('You watched birds for', total_days, 'days.')
print('In total, you saw', total_birds, 'birds.')
print("That's an average of", average, 'per day.')
```