Session 8: Box-and-Pointer Diagrams, and Implementing Classes

Name:_________________________________ CM: _________ Section: _____ Grade: ________ of 10

Range expressions:

1. What is the output of the following code snippet?

```
for k in range(200, 215):
    print(k)
```

2. Modify the code above so that it also prints the 215 as part of the output.

3. Joe wants his **`for`** loop to output the numbers counting DOWN from 100 to ***n***, inclusive, for some number ***n*** smaller than 100. He writes:

```
for k in range(100, n, -1):
    print(k)
```

He correctly remembered the step of -1, but made another small bug. Find and fix it.

Box and pointer diagrams:

4. Draw a box-and-pointer diagram for the following statements. Recall that you should cross out the arrows rather than erase them:

```
x = 17
x = x + 5
```

5. Draw a box-and-pointer diagram for the following statements.

```
p = rg.Point(50, 70)
p.x = 25
```

6. Draw a box-and-pointer diagram for the following statements.

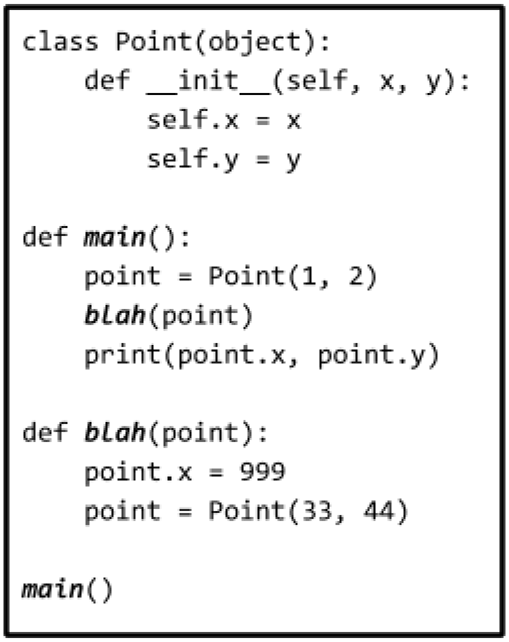
```
p = rg.Point(50, 70)
x2 = p.x
p.x = 25
```

What is the value of **`x2`** after this code runs? _____________
Use your box and pointer diagram to help.

(Suggestion: ask for the answer to the above and use it to check your diagram.)

(This quiz continues on the back of this page.)

7. What gets printed when the code to the right runs?



```
class Point(object):
    def __init__(self, x, y):
        self.x = x
        self.y = y

def main():
    point = Point(1, 2)
    blah(point)
    print(point.x, point.y)

def blah(point):
    point.x = 999
    point = Point(33, 44)

main()
```

8. Every object in Python has **two** things: what are they? (Put a mark by TWO of the following items.)

_____ A type

_____ A value

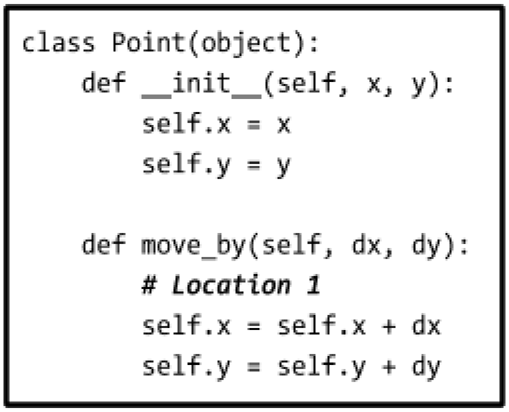
_____ An accumulator

9. In object-oriented programming, you can create custom classes. What is a ***class***?

_____ A collection of students   _____ A custom type   _____ A socioeconomic group

10. What is the name of the ***constructor method*** in Python? (don't forget the underscores)

11. Recall that classes have a *name*, *instance variables*, and *methods*. Here (below and to the right) is the definition of part of a simple class that you saw in the video:



```
class Point(object):
    def __init__(self, x, y):
        self.x = x
        self.y = y

    def move_by(self, dx, dy):
        # Location 1
        self.x = self.x + dx
        self.y = self.y + dy
```

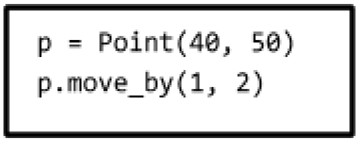
a. Give an example from the code of an ***instance variable***:

b. Give an example from the code of a ***method***:

c. What is the ***name*** of the class? _________________

d. What ***keyword*** was used to define the class? _________

12. Continuing the previous problem (with its **`Point`** class), consider the two lines of code shown to the right. When those two lines of code run, the execution of the second line brings us to Location 1 (see the *Point* class above to find Location 1). **At Location 1, what are the values of:**



```
p = Point(40, 50)
p.move_by(1, 2)
```

`self` ____

dy _______________________   **`self.y`** _______________________