

Week 2 Practice Lecture Exercise Series

Square Bottom Right Calculation

Exercise 1a: Calculate Square Dimensions

Task: Write a function `square_dimensions` that:

- Asks the user for the top-left x and y coordinates of a square.
- Assumes a fixed width and height of 100.
- Prints the top-left and top-right coordinates.

```
def square_dimensions():
    x = int(input("Enter the x coordinate of the top-left corner: "))
    y = int(input("Enter the y coordinate of the top-left corner: "))

    # Top-left remains the same
    print("Top-left coordinates:", x, y)

    # Top-right is (x + 100, y)
    top_right_x = x + 100
    print("Top-right coordinates:", top_right_x, y)

>> square_dimensions()
```

Solution Example:

```
Enter the x coordinate of the top-left corner: 50
Enter the y coordinate of the top-left corner: 50
Top-left coordinates: 50 50
Top-right coordinates: 150 50
```

Exercise 1b: Calculate Bottom Coordinates

Task: Enhance the `square_dimensions` function to:

- Calculate and print the bottom-left and bottom-right coordinates.

Code:

python

```
def square_dimensions():
    x = int(input("Enter the x coordinate of the top-left corner: "))
    y = int(input("Enter the y coordinate of the top-left corner: "))
```

```

print("Top-left coordinates:", x, y)

top_right_x = x + 100
print("Top-right coordinates:", top_right_x, y)

bottom_left_y = y + 100
print("Bottom-left coordinates:", x, bottom_left_y)

bottom_right_x = x + 100
print("Bottom-right coordinates:", bottom_right_x, bottom_left_y)

>>square_dimensions()

```

Solution Example:

```

Enter the x coordinate of the top-left corner: 50
Enter the y coordinate of the top-left corner: 50
Top-left coordinates: 50 50
Top-right coordinates: 150 50
Bottom-left coordinates: 50 150
Bottom-right coordinates: 150 150

```

Point Within Rectangle Check

Exercise 2a: Rectangle Boundary Calculation

Task: Create a function `rectangle_boundaries` that:

- Asks for the top-left x and y coordinates of a rectangle.
- Assumes width and height of 100.
- Prints the x and y ranges of the rectangle.

Code:

python

```

def rectangle_boundaries():
    x = int(input("Enter the x coordinate of the top-left corner: "))
    y = int(input("Enter the y coordinate of the top-left corner: "))

    x_max = x + 100
    y_max = y + 100

    print("X range:", x, "to", x_max)
    print("Y range:", y, "to", y_max)

```

```
>>rectangle_boundaries()
```

Solution Example:

```
Enter the x coordinate of the top-left corner: 50
Enter the y coordinate of the top-left corner: 50
X range: 50 to 150
Y range: 50 to 150
```

Circle Area Calculation

Exercise 3a: Circle Circumference

Task: Create a function `circle_circumference` that:

- Asks the user for the center x and y coordinates of a circle.
- Uses a fixed radius of 50.
- Calculates and prints the circumference using the formula $(2 \pi r)$.

```
import math
```

```
def circle_circumference():
    x = int(input("Enter the x coordinate of the center: "))
    y = int(input("Enter the y coordinate of the center: "))

    radius = 50
    circumference = 2 * math.pi * radius

    print("The circumference is", circumference)

>> circle_circumference()
```

Solution Example:

```
Enter the x coordinate of the center: 100
Enter the y coordinate of the center: 100
The circumference is 314.1592653589793
```

Exercise 3b: Circle Area

Task: Enhance `circle_circumference` to:

- Calculate and print the area of the circle using the formula πr^2 .

```
import math
```

```
def circle_circumference():  
    x = int(input("Enter the x coordinate of the center: "))  
    y = int(input("Enter the y coordinate of the center: "))  
  
    radius = 50  
    circumference = 2 * math.pi * radius  
    area = math.pi * radius ** 2  
  
    print("The circumference is", circumference)  
    print("The area is", area)  
  
>> circle_circumference()
```

Solution Example:

```
Enter the x coordinate of the center: 100  
Enter the y coordinate of the center: 100  
The circumference is 314.1592653589793  
The area is 7853.981633974483
```

Point Within Circle Check

Exercise 4a: Distance Between Points

Task: Write a function `distance_between_points` that:

- Asks the user for two sets of x and y coordinates.
- Calculates and prints the distance between these points using the distance formula.

```
import math  
  
def distance_between_points():
```

```
x1 = int(input("Enter the x coordinate of the first point: "))
y1 = int(input("Enter the y coordinate of the first point: "))
x2 = int(input("Enter the x coordinate of the second point: "))
y2 = int(input("Enter the y coordinate of the second point: "))
```

```
distance = math.sqrt((x2 - x1) ** 2 + (y2 - y1) ** 2)
print("The distance between the points is", distance)
```

```
>> distance_between_points()
```

Solution Example:

```
Enter the x coordinate of the first point: 0
Enter the y coordinate of the first point: 0
Enter the x coordinate of the second point: 3
Enter the y coordinate of the second point: 4
The distance between the points is 5.0
```