

Chapter 6 Review Questions

1. Separating a program into distinct sections is referred to as _____.
2. A section of code that contains a group of associated statements that perform a specific task is referred to as a _____.
3. To execute a function, it must be _____.
4. The two types of functions are _____ functions and _____ functions.
5. The code within a function is called the function _____.
6. The first line of a function that contains the name and parameter list for the function is called the function _____.
7. Indentation in the program forms _____ of code.
8. The area of a program where a variable is accessible is referred to as the variable's _____.
9. A variable declared inside a function is referred to as a _____ variable.
10. A variable that is declared outside all functions is referred to as a _____ variable.
11. A variable that should not be changed by the program and is named with all uppercase letters with words separated by underscores is referred to as a _____.
12. Technically speaking, a value passed to a function is called an _____.
13. Technically speaking, a value received by a function is called a _____.
14. A value-returning function must have a _____ statement.
15. A term used to describe multiple programmers working together on the same program is _____.
16. An IPO document contains brief descriptions of the _____, _____, and _____ of a program or function.
17. The statement used to access the functions in a module, is the _____ statement.
18. The module available in Python that contains functions for square root and others is the _____ module.
19. The module in Python that provides random number functions is called the _____ module.

Chapter 6 Short Answer Exercises

1. Write a statement that calls the following function.

```
def show_output( ):
    print('Hello from my function')
```

2. What does the following statement declare?

```
EARTH_DIAMETER = 3963:
```

3. Write a statement that calls the following function and passes it the phrase 'Hello World'.

```
def show_output(phrase ):
    print(phrase)
```

4. What do the following lines of code output?

```
def main( ):
    smallest(6, 3)

def smallest(first, second):
    if first < second:
        print('first is smaller')
    else:
        print('second is smaller')
```

5. Write a statement that calls the following function and stores the return value in a variable named num.

```
def get_value( ):
    val = int(input('Enter an integer '))
    return val
```

6. What data type does the following function return and what will it return if it is called and the number 5 is passed to it?

```
def is_even(num):
    even = False
    if num % 2 == 0:
        even = True
    return even
```

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7. What do the following lines of code output?

```
num = math.sqrt(math.sqrt(16))
print(num)
```

8. Write a statement that will assign the variable num a random integer between 1 and 100.
9. Write a statement using randrange that will assign the variable num a random number between 1 and 100 inclusive.
10. Write a statement that will assign the variable num a number between 1 and 100 that is a multiple of 5 (5, 10, 15, 20, etc.).
11. Write a statement that will assign the variable num with a random number between 0.0 and 1.0.
12. What does the following loop produce?

```
for x in range(10):
    print(int(random.random( ) * 10 + 1), end=',')
```

Chapter 6 Programming Exercises

1. Write a function called display_num that obtains a number from the user and prints 'You entered ' and the number that was entered.
2. Write a function called get_input that obtains a number from the user and returns the number that was entered.
3. Write a program that calls a function average, passes it three arguments, and the function returns the average of the numbers. Print the average that is returned from the function from main. Write an IPO for the function.
4. Write a program with three (3) functions. The first function will obtain the radius of a circle from the user, the second function will compute and return the circumference of the circle, and the third function will display 'The circumference of the circle is ' with the result. The equation for circumference is shown here.

$$C = 2\pi r$$

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5. Modify the circle program in #4 to locate the functions in a separate module, and import the module into the main file.
6. Write a program with four (4) functions located in a separate module. The program will prompt the user for the two side lengths of a rectangle and validate the input (must be > 0). The first function called will compute and return the area, the second function will compute and return the perimeter, the third function will compute and return the diagonal, and the fourth function will display the output as shown in the sample below. Use the Pythagorean Theorem for the diagonal and import math in the module.

```
Enter the length of side 1 3
Enter the length of side 2 4
The area is : 12.0
The perimeter is : 14.0
The diagonal is : 5.0
```

7. Write a sales program with five (5) functions located in a separate module. The first function will obtain and return the price of the item being purchased, the second function will obtain and return the quantity of the items being purchased, the third function will compute and return the total price for the items, the fourth function will compute and return the tax amount at 7% (0.07), and the fifth function will display all of the information as shown (output alignment is not critical).

```
Enter the price of the item: 12.34
Enter the number of items: 2

Price      $12.34
Quantity   2
Subtotal   $24.68
Sales tax  $1.73
-----
Total Sale $26.41
```

8. Write a program that displays 10 random numbers between 1 and 20 inclusive. No functions are required.
9. Write a program that displays 10 odd random integers between 1 and 100 inclusive separated by colons. Consider how to display only odd values. No functions are required.
10. Write a program that displays random number variation graphically using asterisks. The program will generate 20 random integers between 1 and 20

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inclusive, and display that many asterisks in a row for each number. A six row sample is shown below.

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

11. When four random numbers are generated between 1 and 6 inclusive, the probability is high that at least one 6 will be produced. Write a program that calls a function that produces four (4) random numbers and returns true if a six was produced and false if not. If true is returned output "A six" otherwise output "No six". Call the function 20 times in the program. Are there more sixes than expected?
12. Write a program uses the last random number generated as the upper limit for the next random number. The program will generate a random number between 0 and 100 inclusive, then it will use that number as the upper limit for another random number between 0 and that number, then use that number as the upper limit, and so on... Output the random number each time and end the program when the number generated is zero. Run the program 10 times. On average, how many numbers are displayed?

Chapter 6 Programming Challenge

Meteor Evacuation Status Simulation

Design and develop a program that determines the evacuation status for a city based upon the size and distance of a meteor coming toward the city. The program will accept a meteor size in meters and a distance from the city in miles, and compute and display the meteor data and evacuation status. Allow the user to enter another set of data without restarting the program.

Required six (6) functions located in a separate module:

- Prompt for and obtain, validate (must be > 0.0 and < 10), and return the user input of the meteor size in meters
- Prompt for and obtain, validate (must be > 0.0 and < 500), and return the distance of the meteor in miles
- compute and return the meteor's speed ($120 \text{ mph} * \text{size}$)
- compute and return the time to impact (distance/speed) in minutes
- determine and return the evacuation status for the city based on the criteria below

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- display the data as shown below

Evacuation Status Criteria:

If the time to impact < 45 minutes, then Evacuation CANNOT BE COMPLETED

If time to impact > 45 and <= 90 minutes, then Evacuation is POSSIBLE

If the meteor time to impact is > 90, then Evacuation is PROBABLE

Note that speed is in mph, but time to impact is in minutes.

```
Enter the meteor size in meters: 3
Enter the meteor distance in miles: 400
```

```
Meteor Data:
```

```
Diameter in meters:      3.0
Distance in miles:      400.00
Speed in mph:           360.00
Minutes to impact:      66.67
```

```
Evacuation Status: Evacuation is POSSIBLE
```

```
Run again? enter "Y"
```
