Studying for the SE115 Final Exam

Week 11

Question 1

Write a **function** that accepts two integer values as parameters and returns the larger integer value.

Question 2

Write a **function** that accepts two integer arrays of the **same size**. The function should create a new array that can store the values in both arrays. To combine (or merge) these two arrays, compare the elements one by one in each array and write the smaller value and then the larger value to the new array. The function should return the new array.

For example, for two arrays { 2, 10, 3 } and { 1, 3, 5 }, you should compare the first element of each, 2 and 1, and place 1, then 2 into the larger array. The final larger array should be {1, 2, 3, 10, 3, 5}

Question 3

Write a **program** that takes two arguments: your name and the number of times to print it on the screen.

Question 4

Write a **program** that takes a number of arguments. For each argument, find the number of the character ‘a’ appears. The program should print the number of ‘a’s in all arguments.

Question 5

Write the following recursive function using a loop.

```
public class Recursion {
  public static void main(String[] args) {
    int m = recurse(10);
    System.out.println(m);
  }
  public static int recurse(int a) {
    if(a == 1) return 1;
    return a + recurse(a - 1);
  }
}
```

Question 6

A point in 3D space can be denoted by its x, y, and z coordinates. The distance between two points can be found using the Euclidean distance: simply subtract each respective coordinate of two points, take their squares, add them, then take the square root. In mathematical terms, for Point P(x, y, z) and Point Q(a, b, c) the distance *d* between them is:

$$d = \sqrt{(x-a)^2 + (y-b)^2 + (z-c)^2}$$

Create a list of 50 random points in 3D space, where x, y, and z coordinates are randomly set between 0 and 100. Then ask the user to enter the x, y, z coordinates for a point R. Find the most distant point to R in the randomly generated list and print point R, the most distant point, and the distance between them.

Question 7

Convert the following binary numbers to decimals. **Show your work.**

$(100101)_2$ =

$(1001)_2$ =

$(1110)_2$ =

$(11001)_2$ =

$(10)_2$ =

Question 8

Write the **program** which will output the following triangle. The user should enter the base value. If it is an even number, add 1 so that it becomes an odd number. The output is for the base size of 5.

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

Question 9

Write a **function** that accepts three string variables and returns the longest of the three.

Question 10

Consider the following summation:

$$S = \frac{1}{2} - \frac{2}{3} + \frac{3}{4} - \frac{4}{5} + \cdots$$

Write a **function** that returns the sum of the first N number of terms.

Question 11

The duration of a song can be represented by the number of minutes and the number of seconds of the song's length. These two values are always integers. For example, a song can be 3 minutes and 25 seconds long.

Write a **function** that accepts a list of duration values and returns the total duration.

Hint: Do not forget that a minute is 60 seconds long. There is no duration such as 3 minutes and 100 seconds; that must be 4 minutes and 40 seconds.

Question 12

To convert temperatures in degrees Fahrenheit to Celsius, subtract 32 and multiply by .5556 (or 5/9). To convert temperatures in degrees Celsius to Fahrenheit, multiply by 1.8 (or 9/5) and add 32.

Create a class that can return the current temperature in either Celsius or in Fahrenheit.

Hint: You may choose to save the temperature in one of these scales, and convert to the other scale as necessary.