CSC 212: Data Structures and Abstractions

Fall 2018

University of Rhode Island

Weekly Problem Set #5

Due Thursday 10/11 at the beginning of class. Please turn in neat, and organized, answers hand-written on standard-sized paper **without any fringe**. At the top of each sheet you hand in, please write your name, and ID.

1. Write a recursive function that sums all of the elements of a given n length array, matching this signature: `int sum(int* arr, int n);`

2. Rewrite the recursive sum function to only sum odd numbers within the array.

3. Write a recursive function that can find the minimum of a given array, matching this signature: `int min_array(int* arr, int n);`

4. Reverse the elements of an array in place. Matching the following function signature: `void reverse_array(int* arr, int n);`

5. Write a function to print triangles to `std::cout` that takes three positive integers: a, b, c as input. The function should print the `+` character a times, then $a+c$ times, then $a+c+c$ times, and so on. This pattern should repeat until the line is b characters long. At that point, the pattern is repeated backwards. For example calling `draw_triangle(4, 7, 1)` will output: (where the dollar symbol is the bash command prompt)

```
++++
+++++
++++++
+++++++
+++++++
++++++
+++++
++++
```

6. Recursively multiply two numbers together, *without using the * operator*. Matching the following function signature:

   `int multiply(int a, int b);`

7. Recursively calculate a suffix summation, which is the sum from n to $n - s$, matching the following function signature:

   ```
   int suffix_sum(int n, int s);
   ```

   For example, the suffix sum of $n = 5, s = 2$ is $(5 + 4 + 3) = 12$

8. Write a function that returns 1 if a character array is a palindrome and 0 if it is not. Match the following function signature:

   ```
   char palindrome(char *a, int length);
   ```

9. Write a recursive function that returns the nth member of the Fibonacci series, with elements 0 and 1 being 1 and 1 (so the series starts 1, 1, 2, 3, 5, 8, 13, ...). Match the following signature:

   ```
   unsigned fibSeries(unsigned n);
   ```

10. For both insertion and selection sort, describe if the algorithm is stable and if not give an example array that shows the unstable behavior.