CSCE 145 Exam 1 Review

What to Expect

- Variables and Basic Computation
- Strings and String Operations
- Branching Statements
- Loops
- Arrays
- Searching and Sorting with Arrays
- Anything covered in a Lecture or Lab.

What will NOT be on the Exam

- Switch statements
- For-Each loops
- Multidimensional Arrays
- Enumerations
- Methods
- Classes / Objects
1. Drawing Triangles

Objective:
Write a program where the user enters a number greater than 0, and the program prints out a right triangle of asterisks (*) where the number is the width of the base and the height. The triangle’s base must be at the top and the point must be at the bottom. If the user enters an invalid value, then the program should print out “Invalid Value” and stop the program.

Requirements:
- Functionality. (20pts)
  - No Syntax Errors. (20pts*)
    - *Code that cannot be compiled due to syntax errors is nonfunctional code and will receive no points for this entire section.
  - User Inputs the width of the triangles base (5pts)
    - This value must be greater than 0 otherwise the program must print “Invalid Value” and stop.
    - All must apply for full credit.
  - Print out upside-down right triangle of asterisks. (15pts)
    - The triangle printed must be composed of asterisks (“*”).
    - The number of asterisks to be printed on the first line must correspond to the inputted width. The next line to be printed must be one less than the width, then the following line must be two less than the width, and this must continue until there is exactly one asterisk to be printed. For example, if the user enters 4 for the width, then the program should output.
      
      ****
      ***
      **
      *
    - All must apply for full credit.
- Coding Style. (2pts)
  - Readable Code
    - Meaningful identifiers for data and methods.
    - Proper indentation that clearly identifies statements within the body of a class, a method, a branching statement, a loop statement, etc.
    - All the above must apply for full credit.
- Comments. (3pts)
  - Your name in the file. (1pts)
  - At least 5 meaningful comments in addition to your name. These must describe the function of the code it is near. (2pts)
Solution Tests:

- Does the solution compile?
- Does the solution have your name in the comments and 5 meaningful comments that describe the code?
- If the user enters 5, then does the program print out:
  
  *****
  ****
  ***
  **
  *

- If the user enters 3, then does the program print out:
  
  ***
  **
  *

- If the user enters -1, does the program print out “Invalid Value” and stop the program?
2. Moving Particles

Objective:
Write a program that prints out each position per 1.0 simulated second of a particle given an initial starting x and y position, velocities in the x and y direction, and a simulated number of positive, non-zero seconds.

Requirements:
- Functionality. (20pts)
  - No Syntax Errors. (20pts*)
    - *Code that cannot be compiled due to syntax errors is nonfunctional code and will receive no points for this entire section.
  - User Inputs (5pts)
    - The user must be able to enter the starting X and Y position of the particle, the velocities in the X and Y direction, and the number of simulated seconds.
    - All of these values are assumed to be a decimal type.
    - The number of seconds entered must be a positive, non-zero value. Otherwise the program must print “Invalid Value” and stop. All other values may be positive, negative, or 0.
    - All must apply for full credit.
  - Print out the particle positions. (15pts)
    - The program must print the time and position of the particle for each simulated second.
    - The program must first print the starting position at second 0, and update and print each second and position until the given number of simulated seconds has been reached (inclusive) or exceeded.
    - The equation for calculating positions are:

      \[
      \text{Current X} = \text{Starting X} + \text{Velocity X} \times \text{Current Simulated Second} \\
      \text{Current Y} = \text{Starting Y} + \text{Velocity Y} \times \text{Current Simulated Second}
      \]

    - All must apply for full credit.
- Coding Style. (2pts)
  - Readable Code
    - Meaningful identifiers for data and methods.
    - Proper indentation that clearly identifies statements within the body of a class, a method, a branching statement, a loop statement, etc.
    - All the above must apply for full credit.
- Comments. (3pts)
  - Your name in the file. (1pts)
  - At least 5 meaningful comments in addition to your name. These must describe the function of the code it is near. (2pts)
Solution Tests:

- Does the solution compile?
- Does the solution have your name in the comments and 5 meaningful comments that describe the code?
- If the user enters 0.0 for the starting x, 0.0 for the starting y, 1.0 for the x velocity, 1.0 for the y velocity, and 10.0 for the number of seconds, then does the program print out:

  Second: 0.0 x: 0.0 y: 0.0  
  Second: 1.0 x: 1.0 y: 1.0  
  Second: 2.0 x: 2.0 y: 2.0  
  Second: 3.0 x: 3.0 y: 3.0  
  Second: 4.0 x: 4.0 y: 4.0  
  Second: 5.0 x: 5.0 y: 5.0  
  Second: 6.0 x: 6.0 y: 6.0  
  Second: 7.0 x: 7.0 y: 7.0  
  Second: 8.0 x: 8.0 y: 8.0  
  Second: 9.0 x: 9.0 y: 9.0  
  Second: 10.0 x: 10.0 y: 10.0

- If the user enters 1.0 for the starting x, 2.0 for the starting y, 3.0 for the x velocity, 4.0 for the y velocity, and 5.0 for the number of seconds, then does the program print out:

  Second: 0.0 x: 1.0 y: 2.0  
  Second: 1.0 x: 4.0 y: 6.0  
  Second: 2.0 x: 7.0 y: 10.0  
  Second: 3.0 x: 10.0 y: 14.0  
  Second: 4.0 x: 13.0 y: 18.0  
  Second: 5.0 x: 16.0 y: 22.0

- If the user enters 1.0 for the starting x, 2.0 for the starting y, 3.0 for the x velocity, 4.0 for the y velocity, and 0.0 for the number of seconds, then does the program print out:

  Invalid Value
Part 4 - Arrays

3. Write a program that finds the minimum and maximum number in an array of integers entered by the user. Then subtracts the maximum from the minimum and prints the result.

Requirements:
- Functionality. (20pts)
  - No Syntax Errors. (20pts*)
    - *Code that cannot be compiled due to syntax errors is nonfunctional code and will receive no points for this entire section.
  - User Inputs the size and values of the array. (8pts)
    - The program must ask the user for the size of the array. This value must be strictly greater than zero, otherwise the program must print “Invalid Array Size” and immediately terminate. Otherwise, the program must create an array of integers of that size.
    - The program must ask the user to input each value, and then must store those values into the array. These values may be positive, negative, or 0.
    - All must apply for full credit.
  - Find the Minimum and Maximum Values. (8pts)
    - The program must then determine the maximum and minimum value in the array.
    - In the case that all values are the same, then the maximum and minimum are the same values.
    - All must apply for full credit.
  - Print the Maximum Value, Minimum Value, and the Maximum minus the Minimum value.
    - The program must the print the maximum value and minimum value found in the Array.
    - The program must then print the difference between the maximum and minimum values.
    - All must apply for full credit.
- Coding Style. (2pts)
  - Readable Code
    - Meaningful identifiers for data and methods.
    - Proper indentation that clearly identifies statements within the body of a class, a method, a branching statement, a loop statement, etc.
    - All the above must apply for full credit.
- Comments. (3pts)
  - Your name in the file. (1pts)
  - At least 5 meaningful comments in addition to your name. These must describe the function of the code it is near. (2pts)
Solution Tests:

- Does the solution compile?
- Does the solution have your name in the comments and 5 meaningful comments that describe the code?
- If the array contains the values \{5,4,3,2,1\}, then does the program print out:
  
  Maximum Value: 5  
  Minimum Value: 1  
  Maximum - Minimum: 5-1=4  

- If the array contains the values \{10,4,-2,6,8\}, then does the program print out:
  
  Maximum Value: 10  
  Minimum Value: -2  
  Maximum - Minimum: 10--2=12  

- If the array contains the values \{2,2,2,2,2\}, then does the program print out:
  
  Maximum Value: 2  
  Minimum Value: 2  
  Maximum - Minimum: 2-2=0
4. Write a program that multiplies all the values in an integer array entered by the user, called the product, and then prints out the result.

Requirements:

- **Functionality. (20pts)**
  - No Syntax Errors. (20pts*)
    - *Code that cannot be compiled due to syntax errors is nonfunctional code and will receive no points for this entire section.
  - User Inputs the size and values of the array. (8pts)
    - The program must ask the user for the size of the array. This value must be strictly greater than zero, otherwise the program must print “Invalid Array Size” and immediately terminate. Otherwise, the program must create an array of integers of that size.
    - The program must ask the user to input each value, and then must store those values into the array. These values may be positive, negative, or 0.
    - All must apply for full credit.
  - Find the Product. (8pts)
    - The program must then determine the product by multiplying all values together in the array.
    - All must apply for full credit.
  - Print the Product. (4pts)
    - The program must the print the resulting product.
    - All must apply for full credit.

- **Coding Style. (2pts)**
  - Readable Code
    - Meaningful identifiers for data and methods.
    - Proper indentation that clearly identifies statements within the body of a class, a method, a branching statement, a loop statement, etc.
    - All the above must apply for full credit.

- **Comments. (3pts)**
  - Your name in the file. (1pts)
  - At least 5 meaningful comments in addition to your name. These must describe the function of the code it is near. (2pts)

Solution Tests:

- Does the solution compile?
- Does the solution have your name in the comments and 5 meaningful comments that describe the code?
- If the array contains the values \{5,4,3,2,1\}, then does the program print out:

  • If the array contains the values \{2,4,6,8\}, then does the program print out:

  384
• If the array contains the values \{1,2,3,4,5\}, then does the program print out:
  120

• If the array contains the values \{-2,2,-2,2,-2\}, then does the program print out:
  -32
5. Write a program that goes through an array and then changes every instance of an even number into a 0, and then prints out the resulting array.

Requirements:
- Functionality. (20pts)
  - No Syntax Errors. (20pts*)
    - *Code that cannot be compiled due to syntax errors is nonfunctional code and will receive no points for this entire section.
  - User Inputs the size and values of the array. (8pts)
    - The program must ask the user for the size of the array. This value must be strictly greater than zero, otherwise the program must print “Invalid Array Size” and immediately terminate. Otherwise, the program must create an array of integers of that size.
    - The program must ask the user to input each value, and then must store those values into the array. These values may be positive, negative, or 0.
    - All must apply for full credit.
  - Changes Even Values to 0’s. (8pts)
    - The program must then determine if a value in the array is even, and if so then it changes that value to 0.
    - All must apply for full credit.
  - Print the resulting Array. (4pts)
    - The program must print the resulting array, value-by-value where the even values are now 0.
    - All must apply for full credit.
- Coding Style. (2pts)
  - Readable Code
    - Meaningful identifiers for data and methods.
    - Proper indentation that clearly identifies statements within the body of a class, a method, a branching statement, a loop statement, etc.
    - All the above must apply for full credit.
- Comments. (3pts)
  - Your name in the file. (1pts)
  - At least 5 meaningful comments in addition to your name. These must describe the function of the code it is near. (2pts)

Solution Tests:
- Does the solution compile?
- Does the solution have your name in the comments and 5 meaningful comments that describe the code?
- If the array contains the values \{1,2,3,4,5,6,7,8\}, then does the program print out:

  1 0 3 0 5 0 7 0
• If the array contains the values \{2,-2,2,-2,2\}, then does the program print out:
  
  0 0 0 0 0  

• If the array contains the values \{1,3,5,7,9\}, then does the program print out:
  
  1 3 5 7 9
Short Answer Questions
- Questions will be based on materials presented in lecture and in lab.
- Some questions will involve explaining concepts or demonstrating concepts.
- Refer to the Lab Report Questions for the kinds of questions that may be asked.