EGR 125 Name: _____
Introduction to Engineering Methods (C++) Due Date: _____
File: N125-Ch4LB

Chapter 4 Homework

Reading Assignment:
Read Chapter 4 in Introduction to Programming with C++, 3rd Edition, by Liang

Problem Assignment:
Submit each of the following by the assigned due date.

1) (40 pts) Work the following problems in the textbook. Work each problem by hand (not using the compiler). ***Be sure to write out the instructions for each problem and include the given information.*** Work all parts for each problem unless otherwise noted.
   a) Checkpoint Exercise 4.1 on p. 121
   b) Checkpoint Exercises 4.8, 4.9, and 4.10 on p. 126
   c) Checkpoint Exercise 4.20 on p. 138
   d) Checkpoint Exercises 4.23, 4.24, and 4.27 on p. 144

2) (60 pts) Write C++ programs for each of the following. For each program:
   - Use the TCC template (see next page). Complete the items listed in the template.
   - Include plenty of comments.
   - The output should be neatly and clearly formatted.
   - Use good programming style and proper indentation.
   - Turn in a printout of the program and printouts for all required test cases.

   A) ***Letter Grade to Number:*** Write a program for ***Programming Exercise 4.12*** on p. 151 in the textbook.
      - Testing: Run the program for:
        - Two valid lower case grades
        - Two valid upper case grades
        - Two invalid characters

   B) ***Check SSN***: Write a program for ***Programming Exercise 4.23*** on p. 154 in the textbook. Additional notes or specifications:
      - Read the input as a single string.
      - Check the string to be sure that it is of the correct length (11). Display an appropriate error message if the string is not the correct length.
      - Check each symbol in the string for the appropriate ASCII value or range. Display an appropriate error message if the string contains any invalid symbols.
      - If the SSN is valid display an appropriate message.
      - Testing: Run the program for:
        - 123-45-6789
        - Another SSN of your choice (do not use yours!)
        - An input with the incorrect length
        - An input with an incorrect symbol.

C) ***Formatted Table***: Write a program to print a small formatted table showing the radius, diameter, circumference, and area of two circles according to the following specifications:

- Prompt the user to enter the radius of two circles (in cm).
- Display 3 tables. Each table should consist of the table number, the heading, and the values of radius, diameter, circumference, and area using the specified formatting.
  - Table 1: Use the following formatting:
    - Use the table heading shown in the sample output
    - Left justification
    - Fixed format
    - 3 digits after the decimal point
    - Show trailing zeros
  - Table 2: Use the following formatting:
    - Use the table heading shown in the sample output
    - Right justification
    - Fixed format
    - 5 digits after the decimal point
    - Show trailing zeros
  - Table 3: Use the following formatting:
    - Use the table heading shown in the sample output
    - Left justification
    - Scientific format
    - 2 digits after the decimal point
    - Show trailing zeros

Sample Output

```
Enter the radius for circle #1 (in cm): 2
Enter the radius for circle #2 (in cm): 5

Table #1:
Radius(cm)  Diameter(cm)  Circumference(cm)  Area(cm^2)
2.000       4.000         12.566             12.566
5.000       10.000        31.416             78.540

Table #2:
Radius(cm)  Diameter(cm)  Circumference(cm)  Area(cm^2)
   2.00000       4.00000           12.56637    12.56637
   5.00000      10.00000           31.41593    78.53982

Table #3:
Radius(cm)  Diameter(cm)  Circumference(cm)  Area(cm^2)
2.00e+000   4.00e+000     1.26e+001          1.26e+001
5.00e+000   1.00e+001     3.14e+001          7.85e+001
```

- Testing: Run the program for:
  - The example above (radius values of 2 and 5)
  - Another example using radius values between 0.1 and 1
  - Another example using radius values between 10 and 100

Note: If you copy the output into Word or Notepad, you might notice that your tables are no longer properly aligned. Change the font to ***Courier New*** (not a TrueType font) to fix the problem. Non-TrueType fonts use the same amount of space for each character. TrueType fonts do not.