

## Chapter 6 Homework

### Reading Assignment:

Read Chapter 6 in Introduction to Programming with C++, 3<sup>rd</sup> Edition by Liang

### Problem Assignment:

For each program turn in a printout of the main program, any functions, and the output for all test cases indicated. In general, you don't need to protect against illegal inputs for homework problems unless specifically noted. Use the standard TCC template.

Format when using functions:

***Include a prototype (function declaration) before main and show all functions after main.***

***Include comments at the beginning of all functions describing the function.***

1. **Checkpoint Exercises:** 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.**
  - a) (7 pts) Checkpoint Exercise 6.8 on p. 215
  - b) (6 pts) Checkpoint Exercise 6.18 on p. 229
2. (15 pts) **Function with one return value:** Write a C++ function that returns volume of a sphere in cubic meters given the radius in meters. Write a main program that calls the function within a loop in order to print the radius and volume in a table as the radius varies from 1 m to 10 m. The table might appear as shown below:

Radius (m)	Volume (m <sup>3</sup> )
1	4.19
2	
..	
10	

3. (15 pts) **Functions with one return value:** Write a C++ program for Programming Exercise 6.9 (*Conversions between Celsius and Fahrenheit*) on page 254. The table produced should be shown exactly as in the text (use left justification for each column, use the number of digits after the decimal point shown in each column, show trailing zeros, etc)
4. (15 pts) **Function with no return values:** Write a C++ program for Programming Exercise 6.11 on page 254. Test the program for the following cases:
  - A) All upper case letters using 6 characters per line
  - B) All lower case letters using 8 characters per line
  - C) All characters from '1' to 'Z' using 10 characters per line
5. (15 points) **Reference Parameters (returning multiple values):** Write a C++ function that converts standard time to military time. Inputs include hours and minutes in standard time and a character equal to 'a' for am or 'p' for pm. The function call might look like:
 

**MilitaryTime(SHour, SMin, AorP, MHour, MMin);**

 Also write a main program to prompt the user for the inputs (such as 1:30 am), call the function, and display the input and the output in the following form:
  - 12:30 am = 0030    Hint: Using fill('0') is an easy way to show leading zeros.
  - 2:30 am = 0230
  - 3:30 pm = 1530
  - 12:00 am = 0000
 Run the program for the four cases above plus at least three other cases.

6. (13 pts) Reference Parameters (functions with multiple output values): Write a C++ function that when given a string, the function will return the number of uppercase letters, the number of lowercase, and the number of other characters in the string. Also write a main program that:
- Prompts the user to enter a string (use `getline()` to read the string)
  - Calls the function
  - Displays the number of vowels, the number of consonants, and the number of other characters

Test the program for the following cases:

- A) John Doe (Result: 2 uppercase, 5 lowercase, 1 other)  
B) 12 Inches = 1 Foot (Result: 2 uppercase, 8 lowercase, 8 other)  
C) Your name  
D) A sentence with at least 5 words

*(Problem 7 is on the on next page)*

Name: \_\_\_\_\_

7. (12 pts) Determine the output for each part below by hand (do not compile the programs). You can simply fill out and turn in this page.

<pre>// Part 1 - FunctionTest1B #include &lt;iostream&gt; #include &lt;cmath&gt; using namespace std; // Function declarations double Times2(double); double Times3(double); // Main function int main ( void ) { double x = 4.0, y = 6.0,z;   z = Times2(x);   x = Times3(x);   y = Times3(Times2(x) + Times2(y));   cout &lt;&lt; "x = " &lt;&lt; x &lt;&lt; endl;   cout &lt;&lt; "y = " &lt;&lt; y &lt;&lt; endl;   cout &lt;&lt; "z = " &lt;&lt; z &lt;&lt; endl;   return 0;} //Function definitions double Times2(double x) { double y = 2*x;   return y;} double Times3(double y) { double x = 3*y;   return x;}</pre>	<p>x = _____</p> <p>y = _____</p> <p>z = _____</p>
<pre>// Part 2 - FunctionTest2B #include &lt;iostream&gt; #include &lt;cmath&gt; using namespace std; // Function declaration void F2B(int,int,int,int&amp;,int&amp;,int&amp;); // Main function int main ( void ) { int X=2,Y=3,Z=4,A=5,B=6,C=7,X1=8,Y1=9,Z1=10;   F2B(A,B,C,X,Y,Z); // function call   Y += 2;   B += 4;   Y1 += 6;   cout &lt;&lt; "A = " &lt;&lt; A &lt;&lt; "\nB = " &lt;&lt; B &lt;&lt; "\nC = " &lt;&lt; C &lt;&lt; endl;   cout &lt;&lt; "X = " &lt;&lt; X &lt;&lt; "\nY = " &lt;&lt; Y &lt;&lt; "\nZ = " &lt;&lt; Z &lt;&lt; endl;   cout &lt;&lt; "X1 = " &lt;&lt; X1 &lt;&lt; "\nY1 = " &lt;&lt; Y1 &lt;&lt; "\nZ1 = " &lt;&lt; Z1 &lt;&lt; endl;   return 0; } // Function definition void F2B(int A, int B, int C, int&amp; X1, int&amp; X2, int&amp; X3) { A += 2;   X1 += 4;   X2 = (A + B)/2;   X3 = (A - B)/2;   return;}</pre>	<p>A = _____</p> <p>B = _____</p> <p>C = _____</p> <p>X = _____</p> <p>Y = _____</p> <p>Z = _____</p> <p>X1 = _____</p> <p>Y1 = _____</p> <p>Z1 = _____</p>