

## Chapter 6 Homework

### Reading Assignment:

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

**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) (12 pts) Checkpoint Exercise 6.22 on p. 236 (all 4 parts)

### Programming Exercises:

Submit each of the following by the assigned due date. In each case turn in a printout of the main program, any functions, and the output for any 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. Also include comments at the beginning of all functions describing the function.

1. (13 pts) Function with one return value: Write a C++ program for Programming Exercise 6.2 on page 252. Test the program for integers with 1, 3, 5, and 7 digits.
2. (13 pts) Functions with one return value: Write a C++ program for Programming Exercise 6.8 on page 253. 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 in each column, show trailing zeros, etc)
3. (13 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
  - B) All lower case letters
  - C) All characters from '1' to 'z'
4. (14 pts) Reference Parameters (functions with multiple values): Write a C++ function that when given the 3 sides of a triangle it will return the three angles (in degrees). Additionally, write a main program that:
  - Prompts the user to enter the 3 sides (assume that valid values are entered for this exercise)
  - Calls the function
  - Displays the three angles (include the unit degrees)
 Test the program for the following cases:
  - A) 3, 4, 5
  - B) 4, 4, 4
  - C) 3, 4, 6
5. (13 pts) Default arguments: Write a C++ function **Poly** that will return the value of a 1<sup>st</sup> – 5<sup>th</sup> order polynomial of the form:

$$y = A_0 + A_1x + A_2x^2 + A_3x^3 + A_4x^4 + A_5x^5$$

Inputs to the function should include x and the polynomial coefficients,  $A_0 - A_5$ .

The function should use default values of 0 for  $A_2 - A_5$  so that it will work with polynomials that are 1<sup>st</sup> order, 2<sup>nd</sup> order, 3<sup>rd</sup> order, 4<sup>th</sup> order, or 5<sup>th</sup> order and unused higher-order coefficients do not need to be listed in the function call.

Examples: Function Poly could be used to evaluate 1<sup>st</sup>, 2<sup>nd</sup>, and 5<sup>th</sup> order polynomials as follows:

**y = Poly(1,2,3);** (answer:  $y = 2 + 3x = 2 + 3(1) = 5$ )

**y = Poly(2,5,4,3);** (answer:  $y = 5 + 4x + 3x^2 = 5 + 4(2) + 3(2)^2 = 25$ )

**y = Poly(2,3,4,5,6,7,8);** (answer:  $y = 3 + 4x + 5x^2 + 6x^3 + 7x^4 + 8x^5 = 447$ )

- A) Write function Poly as described above.
- B) Write a main function that prompts the user to enter the order (1-5) and then prompts the user to enter the correct number of coefficients and the value of x. The main program should then call function Poly to calculate the output and display the result.
- C) Test the program for the 3 cases above as well as for 3<sup>rd</sup> and 4<sup>th</sup> order polynomials for any values you choose. Check the values by hand (show the calculations) to insure that they are correct.

***(Problem 6 is on the on next page)***

6. (22 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>// Problem 5A #include &lt;iostream&gt; #include &lt;cmath&gt; using namespace std; // Function declarations double Square(double); double Cube(double); // Main function int main ( void ) { double x = 2.0, y = 3.0;   x = Square(x);   y = Cube(x);   cout &lt;&lt; "x = " &lt;&lt; x &lt;&lt; endl;   cout &lt;&lt; "y = " &lt;&lt; y &lt;&lt; endl;   system("Pause");   return 0; } // Function definitions double Square(double y) { double x = pow(y,2);   return x;} double Cube(double x) { double y = pow(x,3);   return y;}</pre>	<p>x = _____</p> <p>y = _____</p>
<pre>// Problem 5B #include &lt;iostream&gt; #include &lt;cmath&gt; using namespace std; // Function declarations void F2(int,int,int,int&amp;,int&amp;,int&amp;); // Main function int main ( void ) { int X=1,Y=2,Z=3,A=4,B=5,C=6,A1=7,A2=8,A3=9;   F2(X,Y,Z,A,B,C);   cout &lt;&lt; "X = " &lt;&lt; X &lt;&lt; " Y = " &lt;&lt; Y &lt;&lt; endl;   cout &lt;&lt; "Z = " &lt;&lt; Z &lt;&lt; " A = " &lt;&lt; A &lt;&lt; endl;   cout &lt;&lt; "B = " &lt;&lt; B &lt;&lt; " C = " &lt;&lt; C &lt;&lt; endl;   cout &lt;&lt; "A1 = " &lt;&lt; A1 &lt;&lt; " A2 = " &lt;&lt; A2 &lt;&lt; endl;   cout &lt;&lt; "A3 = " &lt;&lt; A3 &lt;&lt; endl;   system("Pause");   return 0; } // Function definitions void F2(int X, int Y, int Z, int&amp; A1, int&amp; A2, int&amp; A3) { X = X+5;   A1 = A1*A1;   A2 = (Y + Z)/2;   A3 = (Y - Z)/2;   return;}</pre>	<p>X = _____</p> <p>Y = _____</p> <p>Z = _____</p> <p>A = _____</p> <p>B = _____</p> <p>C = _____</p> <p>A1 = _____</p> <p>A2 = _____</p> <p>A3 = _____</p>