

Homework Assignment #6 – One-Dimensional Arrays

Reading Assignment:

Read Chapter 9, Sections 1-4, in Programming In C++, by D’Orazio
Exercises 9.1 – 9.4 (not to be submitted, but good practice for tests)

Problem Assignment:

1. (60 points – 12 points per part) Write a C++ main program that calls each function listed below. Load values into each array using a list to test each function. Print out results to show original array contents and contents after using the functions. Turn in copies of the program and all results.

Output: The output should clearly show original array contents and the result. For example, the output for part A might look as follows:

Contents of array A before swap: 1 2 3 4 5 6
Contents of array B before swap: 7 8 9 10 11 12
Contents of array A after swap: 7 8 9 10 11 12
Contents of array B after swap: 1 2 3 4 5 6

- A) Include a function to swap the contents of two equal size arrays named A and B.

Form of function call: Swap(A, B, Size)

- B) Include a function to reverse the contents of an array. For example, an array that originally contained the elements 1,2,3,4 would contain 4,3,2,1 after the function call.

Form of function call: Reverse(A, Size)

- C) Include a function to find the length of a vector stored in an array where the length of an

N-dimensional vector L is: $\text{Length} = \sqrt{(L_0)^2 + (L_1)^2 + (L_2)^2 + \dots + (L_{N-1})^2}$

Form of function call: Result = Length(A, Size)

- D) Include a function to find the dot product of two N-dimensional vectors A and B. The result of a dot product is a scalar (single real number), where the

"dot product of A and B" = $A_0 \cdot B_0 + A_1 \cdot B_1 + \dots + A_{N-1} \cdot B_{N-1}$

Form of function call: Result = Dot(A, B, Size)

- E) Include a function to find the cross product of two 3-dimensional vectors A and B. The result of a cross product is another 3-dimensional vector C, where

$$C_0 = A_1 \cdot B_2 - A_2 \cdot B_1$$

$$C_1 = A_2 \cdot B_0 - A_0 \cdot B_2$$

$$C_2 = A_0 \cdot B_1 - A_1 \cdot B_0$$

Form of function call: Cross(A, B, C)

2. (24 points) See next page
3. (16 points) Create a data file containing around (but not exactly) 50 integers. Write a C++ program to read the integers into an array (i.e., search for eof marker). The program should then determine and display the average of the numbers (a real value), the number of integers greater than the average, and the number of integers less than the average. Print the program, the data file, and the output.

2. (24 points) Determine the output for each part below by hand (do not compile the programs).

<pre>// Array Homework: Problem 2A #include <iostream> using namespace std; int main(void) { int const ArraySize=10; int Sum = 0, A[ArraySize] = {10,20,30,40,50}; double Avg; for (int j = 0; j < ArraySize; j++) Sum += A[j]; Avg = Sum/ArraySize; cout << "Avg = " << Avg << endl; system("pause"); return 0; }</pre>	<p>Avg = _____</p>
<pre>// Array Homework: Problem 2B #include <iostream> using namespace std; int main(void) { int const ArraySize=10; int Sum = 0, A[ArraySize]; double Avg; for (int j = 0; j < ArraySize; j++) A[j] = j*j; for (int k = 0; k < ArraySize; k += 2) Sum += A[k]; cout << "Sum = " << Sum << endl; system("pause"); return 0; }</pre>	<p>Sum = _____</p>
<pre>// Array Homework: Problem 2C #include <iostream> using namespace std; int main(void) { int const ArraySize=10; int Sum = 0, A[ArraySize]; double Avg; for (int j = 0; j < ArraySize; j++) A[j] = j*j-j; for (int k = 0; k < ArraySize/2; k++) Sum += A[k]; cout << "Sum = " << Sum << endl; system("pause"); return 0; }</pre>	<p>Sum = _____</p>

<pre>// Array Homework: Problem 2D #include <iostream> using namespace std; int main(void) { int const ArraySize=10; int Sum = 0, A[ArraySize] = {2,4,6,8,10,12,14,16,18,20}; int B[ArraySize] = {1,3,5,7,9,11,13,15,17,19},C[ArraySize]; double Avg; for (int j = 0; j < ArraySize; j++) C[j] = A[j]-B[j]; for (int k = 0; k < ArraySize; k++) Sum += C[k]; cout << "Sum = " << Sum << endl; system("pause"); return 0; }</pre>	Sum = _____
<pre>// Array Homework: Problem 2E #include <iostream> using namespace std; int main(void) { int const ArraySize=10; int Sum = 0, A[ArraySize], B[ArraySize], C[ArraySize]; double Avg; for (int j = 0; j < ArraySize; j++) { A[j] = j+4; B[j] = 2*j; } for (int k = 0; k < ArraySize; k++) { if (A[k]>B[k]) C[k]=A[k]; else C[k] = B[k]; Sum += C[k]; } cout << "Sum = " << Sum << endl; system("pause"); return 0; }</pre>	Sum = _____
<pre>// Array Homework: Problem 2F #include <iostream> using namespace std; int main(void) { int const ArraySize=10; int Sum = 0, A[ArraySize], B[ArraySize], C[ArraySize]; double Avg; for (int j = 0; j < ArraySize; j++) { A[j] = j; B[j] = ArraySize - j; } for (int k = 0; k < ArraySize; k++) { if (A[k]>B[k]) C[k]=0; else C[k] = 1; Sum += C[k]; } cout << "Sum = " << Sum << endl; system("pause"); return 0; }</pre>	Sum = _____