1. Holds ints or doubles hold array or read from file
   1. Average divide total by count
   2. Use pointer notation instead of array notation
   3. No negative numbers
2. Use a class of students where there is student name and grade
   1. Take array of objects of a class
   2. Make sure to delete or deallocate array
   3. Constructor, getters, setters
   4. Can make class above main in the same file
3. The mode in a set of numbers is the number that occurs most often
   1. Dynamically allocate an array and for each person enter the number of pieces of pie each person eats a year
   2. Sort them
   3. Find the number of pieces of pie that occur the most in an array
   4. Keep track of how often occurs most
   5. Print the responses in sorted order

**More About Pointers**

CS 151 – Advanced C++ Programming II  
Homework Exercises

***Module 3 – Pointers, Dynamic Memory Allocation***

Summary

Programming Challenges 1, 2, and 5 - page 701

* For P.C. #2 - Use **arrays of objects** *not* structures

Programming Challenges (10 points each)

These are the Programming Challenges from Chapter 10 of our textbook:

1. Write a program that dynamically allocates an array large enough to hold a user-defined number of test scores.  Once all of the scores are entered the array should be passed to a function that sorts them in ascending order.  Another function should be called that calculates the average score.  The program should then display the sorted list of scores and the average with appropriate headings.  Use pointer notation rather than array notation whenever possible.

When finished with the array, use the delete operator to de-allocate the array.

*Input Validation:  Do not accept negative test scores*

1. Modify the program above to allow the user to enter name-score pairs.  For each student taking the test, the user should enter a string representing name of the student, followed by an integer representing the student's score.  Modify both the sorting and average-calculating functions so they take arrays of *objects*, with each object containing the name and score of a single student.  In traversing the arrays, use pointers than array indices.

When finished with the array, use the **delete** operator to de-allocate the array.

Include a class definition for a student, including a constructor, getters and setters for the name and score, and a destructor.

1. In statistics, the *mode* of a set of values is the value that occurs most often.  Write a program that determines how many pieces of pie most people eat in a year.  Set up a dynamically-allocated integer array that can hold responses from 30 people.  For each person enter the number of pieces they say they eat in a year.  Then write a function that finds the mode of those 30 values (this will be the number of pie slices eaten by the most people).  The function that finds and returns the mode should accept two arguments, an array of integers, and a value indicating how many elements are in the array.

One possible approach is to sort the array after all responses have been entered.  Scan the array, counting the number of times each response occurs consecutively in the array.  Print the responses in sorted order to make verification easier.

Submit all C++ files, and include sample runs for each Programming Challenge.