Group Task: Pointers

Goals: Collaborate on key questions for this module to gain a deeper understanding of pointers

In this task, as a group, you will discuss concepts of pointers and formulate a group response to the topics of pointers. Prepare a **single document** of your group discussion (in a pdf file) and submit it **via Canvas**.

When we say "pointer", we often are using it as shorthand for "pointer variable". Unfortunately, there is where much confusion begins! Hence the motivation for this activity. For each of the following cases, you need to summarize your discussions, but also as a group develop an illustration or diagram for that case. You will show detailed information in your diagram, such as identifiers (such as the name of a variable), data stored, pointer variables and the memory location that a pointer variable indicates.

You may use any materials in the course, the textbook, other books, and online resources to formulate your response. While this is not a formal essay, it should have some structure where the ultimate goal is to illustrate your understanding of pointers and how they will be used as links.

1. Illustrate a pointer variable. Remember that a pointer variable is a variable that holds a memory address, not a data value.
2. Illustrate a pointer to a storage location. A pointer is a variable, so it also has a name, but it holds a memory address, not a value of a standard data type.
3. Illustrate a pointer to a pointer. Similar to #2, but there is an additional pointer variable that have a name.
4. Illustrate an array with 3 elements. Arrays in C/C++ are implemented with pointers, but you can still use the bracket notation. The body of the array will still be contiguous storage locations. Use both the bracket notation and a pointer to indicate that array.
5. Illustrate a two-dimensional array with 2 rows of 3 elements in each row. Multi-dimensional arrays in C/C++ are arrays of arrays. Consider a mxn array. There are m rows of n elements. In this case there are m locations in memory that consist of n contiguous memory locations. The m sets are not required to be contiguous with each other! Use both the bracket notation and

pointers to indicate that array.

6. Illustrate a linked list with 3 nodes. Please draw the memory diagram. Later in this and later courses you will use links. A link is a node with a pointer variable to another node. Think of it like a train. You have a node structure which holds data and a pointer variable "next", indicating the memory location of the next node in the link list. The last node will have a NULL pointer. You also need a pointer variable to the first node of the linked structure.

This is a group activity. Please use the group discussion forum. Please have everyone participate and **understand** the diagrams you create. Please do not just have one person finish all questions and sign everyone's name. Submit a single document with the names of **all who participated**. In case someone still feels uncertain about the concept despite the help of the group, feel free to indicate his/her name in your report. I will not deduct grade from those students. It just gives us (instructor and TAs) an idea of who might need some extra help.