**Take Home: Quiz 4 (15 pts) – C++, Data Structures, and OOP**

Using Canvas <https://canvas.wsu.edu/>, please submit your solution to the correct quiz folder. Your solution should be a .pdf file with the name <your last name>\_quiz4.pdf and uploaded. To upload your solution, please navigate to your correct Canvas ***lab*** course space. Select the “Assignments” link in the main left menu bar. Navigate to the correct quiz submission folder. Click the “Start Assignment” button. Click the “Upload File” button. Choose the appropriate .pdf file with your solution. Finally, click the “Submit Assignment” button.

**1. (4 pts)** In your own words, what is a *copy* constructor?

A copy constructor is a special constructor that creates a new object as a copy of an existing object with the same type. It is implicitly invoked when an object is passed-by-value.

There are two types of copy – shallow copy and deep copy. A shallow copy just copies data members directly over to the object. Besides, a deep copy not simply copies data members, but allocates new similar memory for each data members.

For example, in case we want to copy a linked list. A shallow copy just the head pointer of the original list into the head pointer of the new list. However, a deep copy would firstly allocate new nodes for the new list and then copy the data from corresponding nodes of the original list into these new nodes.

**2. (4 pts)** In your own words, what isa *destructor*?

A destructor is a special member function, which does not return any value. It is declared the same name as the class with a tilde (~) in front. If a class does not explicitly provide a destructor, then the compiler provides an empty destructor.

Destructor is implicitly invoked when an object leaves the scope. For example, when the delete operator is explicitly invoked to free memory of the object on the heap.

**3. (4 pts)** In your own words, what is the *rule of three* or the Law of Three?

The rule refers about the three member functions: destructor, copy constructor, and copy assignment operator. If one or more of them are defined, then all three should be explicitly defined.

**4. (3 pts)** In your own words, what is a *function overloading*?

A function overloading is a feature that allows creating more than one function with the same name as long as they have a different set of parameters, including number and/or type.

For example:

void maxDepth (TreeNode\* root);

void maxDepth (TreeNode\* root, int depth);

These two functions are overloaded functions.

Or just the same number of parameters, but different type:

void openPass (int number);

void openPass (char character);

They are also overloaded functions.