**Take-Home: Quiz 8 (15 pts) – More OOP!**

1. **(8 pts – 2 pts/each)** What are the Four Pillars of Object Oriented Programming? Explain each using your own words.

Abstraction - implementation details of e.g. data storage and methods are irrelevant to user as long as well-defined behavior is exhibitied.

Encapsulation - bundling of data members (attributes) and member functions (methods) in a single accessible blueprinted (class) package (object)

Inheritance - Can enhance classes without redoing everything by deriving them, that is, inheriting attributes from a base or parent class.

Polymorphism - For inherited classes, overriding methods in the base class so that a task can be done with more specific/enhanced behavior in the derived class.

1. **(3 pts)** Given the following function, what is the worst-case Big-O time complexity?

\_\_\_\_\_\_\_O( n^3 )\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

// Prints all subarrays in arr[0..n-1]

void subArray(int arr[], int n)

{

    // Pick starting point

    for (int i=0; i <n; i++)

    {

        // Pick ending point

        for (int j=i; j<n; j++)

        {

            // Print subarray between current starting

            // and ending points

            for (int k=i; k<=j; k++)

{

                cout << arr[k] << " ";

}

            cout << endl;

        }

    }

}

1. **(4 pts)** What is the difference between a *class* and a *struct*? Explain in your own words. Also, be sure to discuss the visibilities of members in each.

Struct - a collection of data members (variables). All members are accessible.

Class - a collection of data members, AND the methods acting upon them bundled together, AND enforces information hiding, i.e. the idea that certain data members or even methods should be made *private* and thus inaccessible from outside of the class. Any interaction or modification to those members must be done through *public* interfaces, which controls information flow into and out of the object and makes sure that the class can only be interacted with in pre-approved ways.