**Take-Home: Quiz 6 (15 pts) – Inheritance in C++**

***Part I: Short Answer.***

**1. (4 pts)** What is inheritance? Explain.

Deriving a new "child" class from an already existing class, copying over the original (base) class's functionality and methods as a starting point. Allows reusability of code (especially already tested code!) and reduces redundancy; resulting code is easier to maintain and more readable.

**2. (5 pts)** In your own words, explain the “diamond” problem in C++.

Suppose B and C are classes derived from a base class A, and D is a class derived from classes B and C. The problem is that B, being derived from A, has a copy of A's attributes and methods. C does as well, for the same reason. So if B and C are both D's parents, D will end up inheriting \*two\* copies of each attribute and method, and be an utter mess, if the code will run at all.

***Part II: Fill-In-The-Blank.***

**3. (2 pts – 1 pt/blank)** A base class’s \_\_\_\_\_public\_\_\_\_\_ and \_\_\_\_\_\_protected\_\_\_\_\_\_\_\_\_\_ members can be accessed in the base-class definition, in derived-class definitions, and in friends of the base class and derived classes.

**4. (2 pts)** Inheritance is representative of a(n) \_\_\_\_\_\_"is-a(n)\_\_\_\_\_\_ relationship. A Rectangle object demonstrates this relationship because it can be treated as a Shape object.

**5. (2 pts)** When an object of a derived class is instantiated, the base class’ \_\_\_\_constructor\_\_\_\_ is called implicitly or explicitly to initialize the data members of the base-class in the derived-class object.