1. a. What is the purpose of a Use case model?

b. Draw one Use case model diagram for the problem described below (do not provide any flow of events): An apartment has a gate entry system. A resident may pull up to the gate, swipe a card. The system will authenticate the card and open the gate if valid. A guest may pull up to the gate and punch in an apartment number. The system will then dial the resident’s number and allow the guest to speak. The resident may press a code to open the gate to allow the guest in or simply hang up. The apartment manager may reprogram an access card, disable an access card, and reassign the phone number of an apartment.

2. What are the advantages and disadvantages of bi-directional navigation vs. using unidirectional navigation (directed association)?
3. Let’s say I have a class A with some functions. I need a class B with similar functions (may be slightly different, mostly same) as in A and may be some added functions.
   a. Explain reasons why you would consider inheriting B from A.

   b. Explain reasons why you would consider aggregating A within B instead of inheriting from A.

4. What is the purpose of a prototype? When would you develop it? How would you develop it?

5. Mention five things an organization can do to reduce the risk in software development.
   a. ........................................................................................................
   b. ........................................................................................................
   c. ........................................................................................................
   d. ........................................................................................................
   e. ........................................................................................................
6. Explain the following:

Velocity ____________________________________________________________

____________________________________________________________________

Spiking _____________________________________________________________

____________________________________________________________________

Cohesion ____________________________________________________________

____________________________________________________________________

Derived attribute ____________________________________________________

____________________________________________________________________

White-box testing ____________________________________________________

____________________________________________________________________

7. What is a Mock Object? When and why would you use it?

8. Draw a UML (class) diagram showing the “relationship” between the following relationships in object modeling: Dependency, Association, Aggregation, Composition and Inheritance (Hint: UML diagram may be used to represent relationships. Why not use UML to describe the notation itself?).
9. Based on the following relationships, draw a UML class diagram (show direction of navigation and multiplicity/cardinality as well): A Person lives in a City of residence. The Person owns a Home. A Person may sell the Home and buy another one at any time. Not all Persons will own a home, however. The Person may also have Cars.

10. If I want to make a copy of a Person described in question 9, explain in words what you would implement in the Person class to facilitate the copying of an object of Person. Explain why you would do it that way.