Name: _____   CS3733 Midterm Examination

1. (a) [**10 pts.**] Identify a strength of the **Incremental Model** and one weakness. Explain.

   S1:

   W1:

   (b) [**10 pts.**] Identify a strength of **Rapid Prototyping** as a Specification Technique and one weakness. Explain.

   S1:

   W1:

   (c) [**5 pts.**] Which life cycle model has less interaction between client and developer: **Spiral** or **Recursive/Parallel**? Explain.

2. [**6 pts.**] Fill in the blanks using the words: Implement, Interface, Method.

   A/An _____ specifies a set of _____s for a class. A class can _____ multiple _____s, but each _____ belongs to exactly one _____.

3. [**10 pts.**] What are two impacts of unnecessary object coupling?

   I1:

   I2:

4. [**6 pts.**] Explain how Class/Responsibility/Collaboration (CRC) diagrams can help identify subsystems.

5. [**6 pts.**] Can **Stamp Coupling** ever occur when passing objects as arguments in a message? For example, `object1->method (obj2)`. If so, explain how. If not, explain why not.

6. [**16 pts.**]   Consider the **PartSortList** class. This class has operations to *create()* a PartSortList. *append(element)* adds an element to the end of the List, *remove(element)* removes an element from the List, if it exists. *insert(element, n)* inserts an element to be the *nth* element in the List; if $n >$ number of elements in list, the element is added to the end of the list. *sort()* sorts the elements in the List. What is the behavioral model of an object of the PartSortList class?

7. [**16 pts.**]   Match concepts with their definition:

   (1) The ability to reuse existing modules
   (2) The feature that changes are localized to individual modules
   (3) Suppressing implementation details of a module from other modules.
   (4) The ability to handle error conditions within a module without revealing the details to other modules.

   ___ (a) Modular composition   ___ (b) Information hiding
   ___ (c) Modular protection   ___ (d) Modular continuity

8. (a) [**12 pts.**]   Consider the following mathematical entities: Real Number, Irrational Number, Odd Integer, Even Integer, Natural Power of 2, Integer, Positive Integers. Construct a Generalization/Specialization Class Hierarchy to model these mathematical constructs.

   (b) [**3 pts.**]   Where does **Prime Number** fit in?