1. (10 Points) What are the common tasks associated with requirements engineering?
Answer: Inception, elicitation, elaboration, negotiation, specification, validation, and management.

2. (5 Points) Among the following UML diagrams, use case diagram, class diagram, activity diagram, state machine diagram, and sequence diagram,
a) Which is(are) scenario-based model(s)?
b) Which is(are) class model(s)?
c) Which is(are) behavior model(s)?
Answer:
a) use case diagram
b) class diagram
c) activity diagram, state machine diagram, sequence diagram

3. (5 Points) Which of the following applies (apply) to requirements engineering in agile process?
a) Determine all requirements for non-trivial products before any implementation is done.
b) Avoid writing comprehensive requirements documents
c) Stakeholder needs are elicited up-front at the beginning of development
d) Use case diagrams and description cannot be used with user stories.
e) Often use scenario-based models.
Answer:
b, e

4. (20 Points) Mark the following statements Ture or False.

True / False	Statement
False	Design model uses different set of UML diagrams from those used in the analysis model.
True	Architecture styles are larger in scope than design patterns.
False	Different architecture styles cannot be used together in a system.
False	With blackboard architecture style, data store is passive.
False	One benefit of layered architecture style is higher runtime performance.
False	Two modules in a data flow system can change their order without any constraints.
True	One limitation of data flow architecture style is that it is not suitable for dynamic interactions.
True	Overhead is a disadvantage of virtual machine architecture style.
False	Clients are tightly coupled with each other in data-centered architecture style.
True	Client and server architecture style is often used in distributed systems.

5. (10 Points) Among the design patterns we studied in class (composite, decorator, factory method, iterator, observer, singleton, and strategy),

a) Which are creational patterns?
b) Which are structural patterns?
c) Which are behavioral patterns?

Answer:
a) factory method, singleton
b) composite, decorator,
b) iterator, observer, strategy

6. (10 Points) Answer the following questions related to design patterns discussed in class.

a) In a web application, there is a single controller to handle request related to student resources. This is an example of what design pattern?
b) In an application, a data source can have multiple UI representations (including tables, line charts, pie charts, etc.). Each of these UI presentations need to be updated when the data source change. What design pattern is most appropriate to support that?
c) There are different readers to read different image types (e.g. JPEG, PNG, SVG, etc.) A client should be able to use a reader depending on the image type. What design pattern is most appropriate to support that?
d) There are many concrete list implementations, a client should be able to access list elements the same way regardless different implementations. What design pattern is most appropriate to support that?
e) A system has many printers, and they all have basic print functionality. However, some of them can print on both side of the paper, some of them can collate output together, and some of them can staple printed documents. What design pattern is most appropriate to support that?

Answer:
a) Singleton
b) Observer
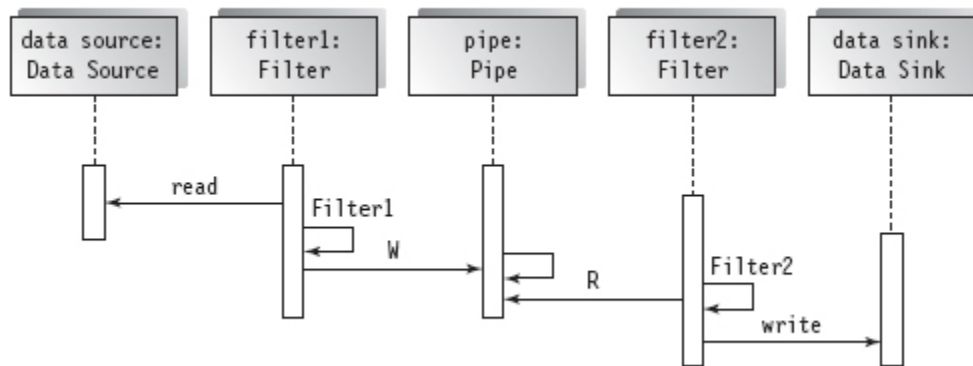c) Strategy
d) Iterator
e) Decorator

7. (10 Points) Read article "Agile–Architecture Interactions" provided on the course web site and chapter 13.11 from the textbook. Answer the following questions:

a) Why some people are against architecture design in agile development?

b) Why some people are for architecture design in agile development?

c) Can architecture design coexist with agile methods?

Answer:

a) Some proponents of agile development view that architectural design is equated with "big design upfront". In their view, this leads to unnecessary documentation and the implementation of unnecessary features.

b) Most agile developers do agree that it is important to focus on software architecture when a system is complex to avoid rework or quality problems if a wrong architecture is chosen.

c) Yes. New architecture practices can be integrated into agile process models like the following one. The architect does up-front planning with regard to architectural functions. The architect then creates architectural user stories, which are prioritized along with business user stories. The architect works with the team to ensure that evolving software continues to show high architectural quality and provides architectural review feedback.

8. (10 Points) Given the following sequence diagram,

a) It describes what architecture style?
b) How many types are involved?
c) How many roles are involved?
d) Are those messages synchronous or asynchronous?
e) For filter1 life line, which of the following describes the correct message order according to when they happen from the earliest to the latest?
     a. Filter1, read, W
     b. Filter1, W, read
     c. read, Filter 1, W
     d. read, W, Filter 1
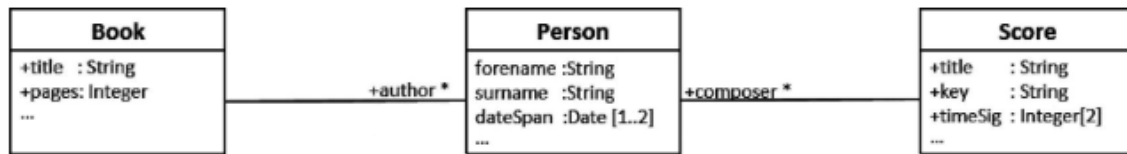   e. W, read, Filter1
     f. W, Filter1, read

Answer:
a) pipe and filter architecture style (or data flow architecture style)
b) 4 types
c) 5 roles
d) They are synchronous
e) c

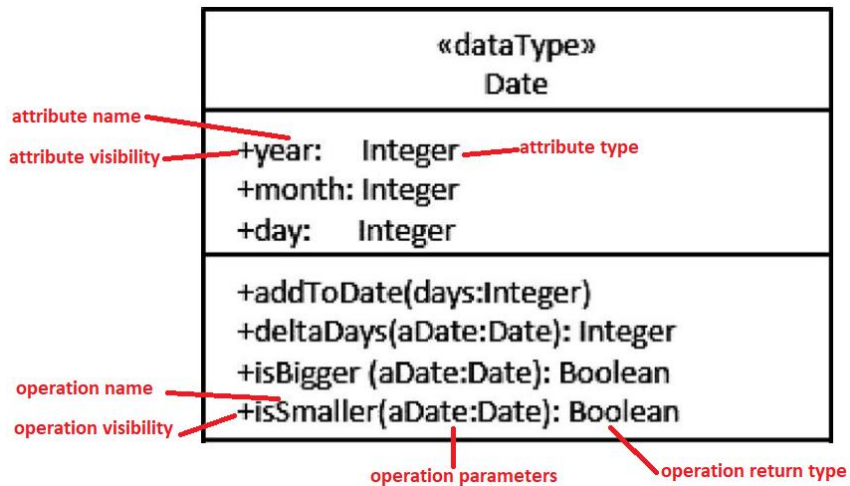9. (20 Points) Draw a class diagram for the classes inside PrinterPool.zip. Make sure to
a) provide visibility for each attribute and method
b) indicate static attributes or methods (if a tool does not support the notation, add the notation to the exported image)
c) indicate types for attributes, method parameters and return
d) use the most appropriate association among classes and interfaces
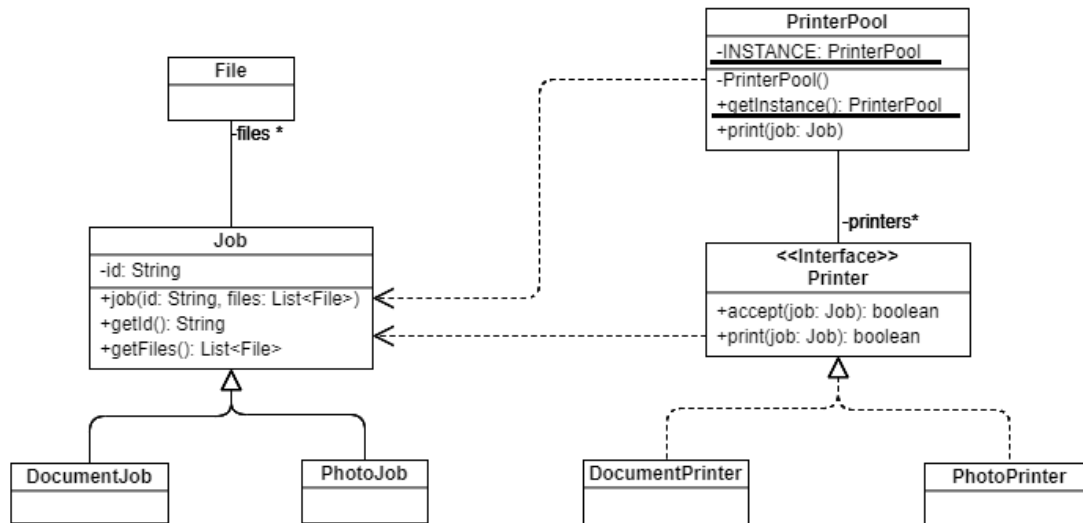
Here are some examples.

A book has many persons as author.
A score has many persons as composer.

Answer:

Submission Note
1) For written part of the questions:
   a) Write your answers inside a text document (in plain text, MS Word, or PDF format)
   b) Name the file as CSC131.firstname.lastname.assignment2.txt(doc, docx, or pdf) with proper file extension
2) Due Oct 13th, 11:59 PM