Instructions: Do 1 of numbers 1 and 2, and any 3 other questions.

1. Construction/Maintenance:

Given **n** sorted lists of integers as file input, write a one-pass algorithm that produces one sorted file of output, where the output is the sorted merger of the **n** input files. Use any *high-level programming language* that you wish. Pseudo-code is *not acceptable.*

Suppose the specification is relaxed to permit unsorted file input, in which case the program will abort with a suitable error message; otherwise the program will function as specified. Outline the changes that you would make to your implementation.

2. Testing/Maintenance:

Given **n** sorted lists of integers as file input, a program is to produce one sorted file of output, where the output is the sorted merger of the input files.

a. Outline a comprehensive strategy for this program. Justify your thinking.

b. Suppose the specification is relaxed to permit unsorted file input, in which case the program will abort with a suitable error message; otherwise the program will function as specified. What changes must be made to the test strategy of part (a)?

The next four questions are organized around the following requirement
    specification:

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InterHome is an energy-efficient smart home to monitor the health of
its occupants. InterHome incorporates embedded devices and standard
home automation systems is capable of learning from its occupants and
taking decisive actions. The smart home features a secure and energy-
efficient living environment, and can send alerts when an occupant has
fallen or is suffering from a stroke. InterHome makes use of a
touchscreen user control panel that allows the home to be monitored and
controlled via a Web browser, smartphone, or SMS-capable mobile device.
The technology enables the system to learn rapidly when we need the
lights on or whether we are at home or at work and how the house needs
to be at certain times of the day. If we forget to lock the front door
or turn off the lights, it can text us and our response can reprogram
the system.
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3. Design. Consider the 5 following usability criteria:
- Learnability: How easy is it for users to accomplish basic tasks the first time they encounter the design?

- Efficiency: Once users have learned the design, how quickly can they perform tasks?

- Memorability: When users return to the design after a period of not using it, how easily can they re-establish proficiency?
- Errors: How many errors do users make, how severe are these errors, and how easily can they recover from the errors?
- Satisfaction: How pleasant is it to use the design?

From a systems engineering perspective, rank these criteria in order of importance to the InterHome project and justify your ranking.

4. Management: What security risks must be managed in the InterHome system? For two of the security risks you have determined, outline an accompanying mitigation strategy.

5. Process: Select a process model for an implementation of the InterHome system. Justify your choice in two ways: reasons for selecting the process model and reasons for not selecting one other process model.

6. Requirements. The specification confuses functional and non-functional requirements.

a. Identify the functional and non-functional requirements.

b. For one of the functional requirements and one of the non-functional requirements that

you extract, write a specification using structured natural language or a design description language.