

Software Design Exam 2022

Question 1

Which of the following statements about state machine diagrams is FALSE?

- A state machine can have zero or more final states.
- A guard condition is only evaluated when the corresponding event occurs.
- **The initial state can have any number of incoming transitions.**
- Events trigger transitions.

Question 2

Which type of combined fragment are you going to use if you need to model the following situation in a UML sequence diagram?

In an e-learning system (e.g. Canvas), students can register for an exam only if they are successfully enrolled into the course corresponding to the exam.

- **Alternative interaction**
- Irrelevant interaction parts
- **Optional interaction**
- Strict order

Question 3

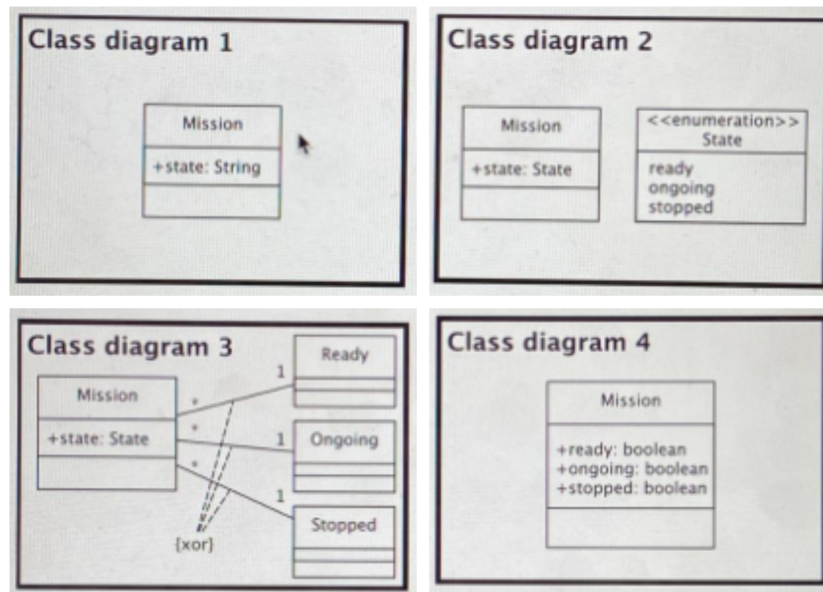
Which of the following statements about source code modules is TRUE?

- Design decisions should be reflected across as many modules as possible.
- The users of the APIs of your class should always know all the methods provided by it.
- When designing modules you should focus on the order in which tasks occur.
- **The design decisions guiding the implementation of a module should not be visible to other modules.**

Question 4

How do you model the following situation with a UML class diagram?

A robotic mission can be exclusively in one of the three following states: ready, ongoing, or stopped.



- Class diagram 1
- **Class diagram 2**
- Class diagram 3
- Class diagram 4

Question 5

Which of the following statements about state machine diagrams is FALSE?

- Activities can be executed during transitions.
- **Transitions can have a list of event triggers, a list of guard conditions, and a list of activities.**
- A transition can have one and only one target state.
- Guard conditions are evaluated before executing all the activities of transitions.

Question 6

Which of the following statements about state machine diagrams is TRUE?

- A transition cannot cross the boundaries of a composite state.
- The guard condition of a transition is evaluated before executing all the activities of the transition.
- **Transitions can have a list of event triggers, a list of guard conditions, and a list of activities.**
- A transition can have only guards and events.

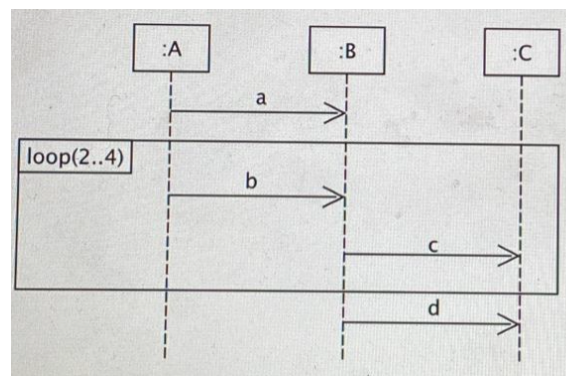
Question 7

Which of the following statements about source code comments is TRUE?

- It is a good practice to reiterate what is provided in external documentation as comments in your code.
- It is good practice to have someone else write the comments on your code.
- Good code is self-documenting, in principles you do not need comments.
- **Comments contain information that could not be represented in the code.**

Question 8

Given the following sequence diagram, which of the four traces below is possible?



- $a \rightarrow b \rightarrow c \rightarrow b \rightarrow c \rightarrow b \rightarrow c \rightarrow b \rightarrow c$
- $a \rightarrow b \rightarrow c$
- **$a \rightarrow b \rightarrow c \rightarrow b \rightarrow c \rightarrow b \rightarrow c \rightarrow d$**
- $a \rightarrow b \rightarrow c \rightarrow b \rightarrow c \rightarrow b \rightarrow d$

Question 9

What is the relationship between a class diagram and an object diagram?

- **An object diagram represents the concrete instances of classes that are modeled in the class diagram.**
- An object diagram represents the overall behavior of all the objects conforming to classes that are modeled in the class diagram.
- An object diagram represents the interaction between classes that are modeled in the class diagram.
- An object diagram represents the internal elements of classes that are modeled in the class diagram.

Question 10

Which of the following statements about UML associations is TRUE?

- An association may have navigable, non-navigable, and partially navigable association directions.
- An association can have multiplicities, but no visibility.
- **An association may be identified by a unique association name.**
- An association represents the fact that instances of a class are special types of instances of another class.

Question 11

Which of the following design patterns would you use when you want to support undo-redo operations?

- Observer
- Factory Method
- **Command**
- Singleton

Question 12

Which of the following statements about the UML generalization relationship is TRUE?

- A generalization relationship may have navigable, non-navigable, and partially navigable directions.
- A generalization relationship may be identified by a unique association name.
- **A generalization relationship does not have multiplicities and visibility.**
- A generalization relationship does not represent the fact that instances of a class are special types of instances of another class.

Question 13

Which of the following statements about compositions (composite aggregations, represented as black diamonds in diagrams) is FALSE?

- The composite aggregation is not a commutative relationship.
- **When the composite element is deleted, the parts are deleted too.**
- In a composition, a part may belong to one and only one composite at a time.
- The composite aggregation can be used in object diagrams.

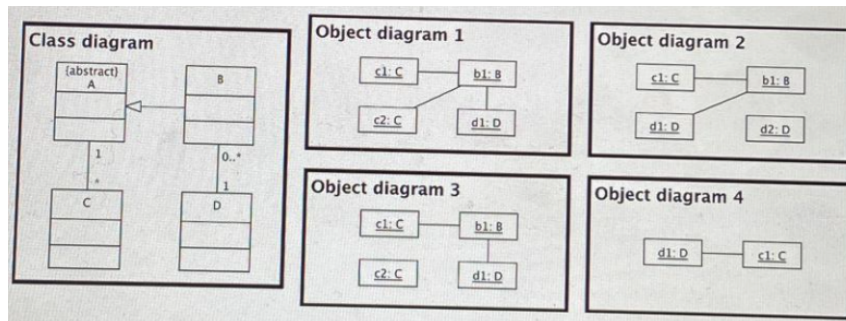
Question 14

Which of the following statements about synchronous and asynchronous communication in sequence diagrams is TRUE?

- With asynchronous communication, the sender pauses to wait for a response.
- **Response messages are optional.**
- With asynchronous communication, the sender optionally pauses to wait for a response.
- With synchronous communication, the sender optionally pauses to wait for a response.

Question 15

Which of the following object diagrams is NOT consistent with the class diagram?



- Object diagram 1
- Object diagram 2
- Object diagram 3
- **Object diagram 4**

Question 16

Which of the following statements about naming variables in your code is FALSE?

- When deciding the name of a variable, the length of the name should not be a decision factor.
- Reuse variable names within the same method is a bad practice.
- It is good practice to give meaningful names to variables.
- **Variable names should be as long as possible.**

Question 17

Which of the following statements about UML state machine diagrams is TRUE?

- Activities can only be executed within states.
- When a transition leaving a state S1 has no explicit trigger event specified, then entering S1 triggers the transition.
- A guard condition of a transition leaving a state S1 is evaluated as soon as S1 is entered.
- **When an event occurs that triggers the transition to another state the do-activity is aborted.**

Question 18

Which of the following properties apply to the *alt* fragment of a UML sequence diagram?

- All operands are executed in parallel.
- All operands within an alt fragment that do not have guard conditions are executed.
- The decision of which operand should be executed is determined exclusively by the order in which the operands are specified.
- **If more than one operand evaluates to true, it is unclear which operand will be executed.**

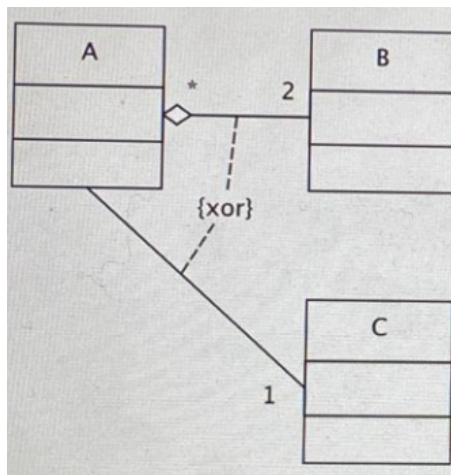
Question 19

What is the main principle of Inversion of Control?

- System-specific portions of code are called from a generic framework (e.g. JavaFX).
- Superclasses always call their subclasses.
- The remote server always calls its clients.
- Subclasses always call their superclasses.

Question 20

Given the following fragment of class diagram, which of the following statements is TRUE?



- One object of B may be associated with multiple objects of A.
- One object of A may contain only two or more objects of B.
- If an instance of A is deleted, all contained instances of B are deleted as well.
- Once object of A is associated with exactly one object of C and two objects of B.