Lecture 3

1. Which method from the Object class is commonly overridden to provide a string representation of an object?  
   A) getString()  
   B) toString()  
   C) print()  
   D) describe()  
   Answer: B
2. What is polymorphism in the context of inheritance?  
   A) The ability to create multiple objects of the same class  
   B) The ability to override methods in a subclass  
   C) The ability for a superclass reference to call the appropriate subclass method  
   D) The ability to have multiple constructors in a class  
   Answer: C
3. Which statement about private methods is true?  
   A) They can be overridden in subclasses  
   B) They are implicitly final  
   C) They are always visible to subclasses  
   D) They must be implemented in subclasses  
   Answer: B
4. What happens if you don't provide a constructor for a class?  
   A) The compiler throws an error  
   B) The class becomes abstract  
   C) The compiler provides a default no-arg constructor  
   D) The class cannot be instantiated  
   Answer: C
5. Which of the following is NOT a valid way to call a superclass constructor?  
   A) super();  
   B) super(args);  
   C) this(super());  
   D) super.super();  
   Answer: D
6. What is the output of System.out.println(new Student()); if Student overrides toString()?  
   A) The memory address of the Student object  
   B) The string "Student@<hashcode>"  
   C) The result of the overridden toString() method  
   D) A compilation error  
   Answer: C
7. Which statement about the 'final' keyword is true when applied to a method?  
   A) The method cannot be called  
   B) The method cannot be overridden in subclasses  
   C) The method must be static  
   D) The method can only be called once  
   Answer: B
8. What is the correct way to call a superclass method from a subclass?  
   A) this.methodName();  
   B) super.methodName();  
   C) parent.methodName();  
   D) superclass.methodName();  
   Answer: B
9. In Java, can a class extend multiple classes?  
   A) Yes, always  
   B) No, Java doesn't support multiple inheritance of classes  
   C) Yes, but only if all superclasses are abstract  
   D) Yes, but only for inner classes  
   Answer: B
10. What is the main difference between overloading and overriding?  
    A) Overloading is in the same class, overriding is in subclasses  
    B) Overloading changes return types, overriding doesn't  
    C) Overriding is in the same class, overloading is in subclasses  
    D) There is no difference, they are the same concept  
    Answer: A
11. What is the primary motivation for using inheritance in object-oriented programming?  
    A) To create multiple instances of a class  
    B) To keep common behavior in one class and split different behavior into separate classes  
    C) To override all methods in a superclass  
    D) To create private variables  
    Answer: B
12. In a UML diagram, how is inheritance represented?  
    A) A dashed line with an open arrow  
    B) A solid line with a closed arrow  
    C) A solid line with a hollow triangle  
    D) A dashed line with a hollow diamond  
    Answer: C
13. What is the correct order of object construction in inheritance?  
    A) Subclass to superclass  
    B) Superclass to subclass  
    C) Random order  
    D) Depends on the programmer's choice  
    Answer: B
14. Which of the following is true about the 'super()' call in a constructor?  
    A) It must be the last line in the constructor  
    B) It must be the first line in the constructor  
    C) It can be placed anywhere in the constructor  
    D) It is optional in all cases  
    Answer: B
15. How can a subclass initialize a private variable in its superclass?  
    A) By directly accessing the variable  
    B) By using a public setter method  
    C) By passing the value to the superclass constructor  
    D) It's not possible to initialize private superclass variables  
    Answer: C
16. What is polymorphism in the context of inheritance?  
    A) The ability to create multiple objects of the same class  
    B) The ability to override methods in a subclass  
    C) The ability for a superclass reference to call the appropriate subclass method  
    D) The ability to have multiple constructors in a class  
    Answer: C
17. What happens if you don't provide a constructor for a class in Java?  
    A) The compiler throws an error  
    B) The class becomes abstract  
    C) The compiler provides a default no-arg constructor  
    D) The class cannot be instantiated  
    Answer: C
18. Which method from the Object class is commonly overridden to provide a string representation of an object?  
    A) getString()  
    B) toString()  
    C) print()  
    D) describe()  
    Answer: B
19. What is the difference between method overloading and method overriding?  
    A) Overloading is in the same class, overriding is in subclasses  
    B) Overloading changes return types, overriding doesn't  
    C) Overriding is in the same class, overloading is in subclasses  
    D) There is no difference, they are the same concept  
    Answer: A
20. Which statement about private methods is true?  
    A) They can be overridden in subclasses  
    B) They are implicitly final  
    C) They are always visible to subclasses  
    D) They must be implemented in subclasses  
    Answer: B

Lecture 4

1. Which of the following is NOT a way to combine regular expressions?  
   a) Repetition  
   b) Concatenation  
   c) Alternation  
   d) Multiplication
2. What does the \* symbol mean in a regular expression?  
   a) One or more occurrences  
   b) Zero or more occurrences  
   c) Exactly one occurrence  
   d) Optional occurrence
3. How can you represent a range of characters in a regex?  
   a) (a-z)  
   b) {a-z}  
   c) [a-z]  
   d) <a-z>
4. Which method is used to find the length of a String in Java?  
   a) size()  
   b) length()  
   c) count()  
   d) characters()
5. What is the purpose of the toCharArray() method in String class?  
   a) To convert a String to lowercase  
   b) To convert a String to uppercase  
   c) To convert a String to an array of characters  
   d) To reverse the String
6. In the context of the lecture, what does "interned Strings" refer to?  
   a) Strings that are concatenated  
   b) Strings that share the same memory location  
   c) Strings that are split  
   d) Strings that are converted to char arrays
7. Which of the following is true about the == operator when comparing Strings?  
   a) It compares the content of the Strings  
   b) It compares the memory addresses of the Strings  
   c) It always returns true for identical Strings  
   d) It is the preferred method for String comparison
8. What is the purpose of the indexOf() method in String class?  
   a) To find the index of a specified character or substring  
   b) To insert a character at a specific index  
   c) To remove a character at a specific index  
   d) To replace a character at a specific index
9. In regular expressions, what does the | symbol represent?  
   a) AND operation  
   b) OR operation  
   c) NOT operation  
   d) XOR operation
10. Which of the following is a correct way to create a new String object?  
    a) String str = String("Hello");  
    b) String str = new String("Hello");  
    c) String str = create("Hello");  
    d) String str = make("Hello");
11. What does the trim() method do to a String?  
    a) Removes leading and trailing whitespace  
    b) Removes all whitespace  
    c) Capitalizes the first letter  
    d) Reverses the String
12. Which method would you use to convert a String to lowercase?  
    a) toLower()  
    b) lowercase()  
    c) toLowerCase()  
    d) makeLowercase()
13. What is the purpose of the concat() method in String class?  
    a) To compare two Strings  
    b) To join two Strings  
    c) To split a String  
    d) To reverse a String
14. In regular expressions, what does the . (dot) symbol represent?  
    a) Any single character  
    b) A literal dot  
    c) End of the String  
    d) A digit
15. Which of the following is NOT a factor in calculating the Flesch Score?  
    a) Number of words per sentence  
    b) Number of syllables per word  
    c) Number of paragraphs  
    d) Total number of words
16. What does the substring() method do?  
    a) Replaces a part of the String  
    b) Extracts a part of the String  
    c) Splits the String  
    d) Reverses a part of the String
17. In Java, what is the default value of an uninitialized String variable?  
    a) ""  
    b) null  
    c) " "  
    d) undefined
18. Which method would you use to replace all occurrences of a character in a String?  
    a) replace()  
    b) replaceAll()  
    c) substitute()  
    d) change()
19. What is the purpose of the matches() method in String class?  
    a) To compare two Strings  
    b) To check if the String matches a regular expression  
    c) To find a substring  
    d) To split the String
20. In regular expressions, what does \d represent?  
    a) Any letter  
    b) Any digit  
    c) Any whitespace  
    d) Any non-digit character

Dijkstra’s single source shortest path algorithm when run from vertex a in the below graph, computes the correct shortest path distance to

A diagram of a diagram

Description automatically generated

only vertex a

only vertices a, e, f, g, h

only vertices a, b, c, d

all the vertices

Is the following statement valid?.

Given a weighted graph where weights of all edges are unique (no two edge have same weights), there is always a unique shortest path from a source to destination in such a graph.

False

Question 12 ‒ Explanation

There can be more than one paths with same weight. Consider a path with one edge of weight 5 and another path with two edges of weights 2 and 3. Both paths have same weights.

Which of the following algorithm solves the all-pair shortest path problem?

Prim’s algorithm

Dijikstra’s algorithm

Bellman-Ford’s algorithm

D. Floyd-Warshall’s algorithm

ANS:

Prim\'s Algorithm is used to find MST of a given graph. Refer: Prim’s Minimum Spanning Tree (MST) Dijikstra\'s Algorithm is used to find the shortest path from source to all the other nodes in a weighted graph. Refer: Dijkstra’s Algorithm BellmanFord\'s Algorithm is used to find the shortest distance from source to all other nodes in a graph that can contain negative weight edges. Refer:Bellman–Ford Algorithm Floyd-Warshall\'s Algorithm: It is an All-pair-shortest path algorithm, used to find shortest distance between every pair of vertices. Refer: Floyd Warshall Algorithm So, option (D) is correct.

Which one of the following algorithm design techniques is used in finding all pairs of shortest distances in a graph?

Dynamic programming

Backtracking

Greedy

Divide and Conquer

A Dynamic programming

Floyd Warshall Algorithm is the All Pairs Shortest Path problem which uses Dynamic Programming to find shortest distances between every pair of vertices in a given edge weighted directed Graph. Option (A) is correct.

Which of the following data structure is useful in traversing a given graph by breadth first search?

Stack

List

Queue

None of the above.

ABNS: QUque BFS performs level-order traversal which can be fairly done using a queue. A queue uses FIFO ordering and the nodes that we enqueue first are explored first maintaining the order of traversal.