1. What is the purpose of a constructor in a Java class?  
Option A: To initialize instance variables  
Option B: To create a new object  
Option C: To define class methods  
Option D: To terminate the program  
Correct Answer: A  
  
2. Which of the following is NOT a valid access modifier in Java?  
Option A: public  
Option B: private  
Option C: protected  
Option D: final  
Correct Answer: D  
  
3. What is the difference between a checked and unchecked exception?  
Option A: Checked exceptions must be handled explicitly, while unchecked exceptions are handled automatically  
Option B: Unchecked exceptions must be handled explicitly, while checked exceptions are handled automatically  
Option C: Checked exceptions are only thrown by the JVM, while unchecked exceptions can be thrown by both the JVM and user-defined code  
Option D: Unchecked exceptions are only thrown by the JVM, while checked exceptions can be thrown by both the JVM and user-defined code  
Correct Answer: A  
  
4. What is the difference between a HashMap and a TreeMap?  
Option A: HashMap stores key-value pairs in a hash table, while TreeMap stores them in a balanced binary search tree  
Option B: TreeMap can store key-value pairs in ascending or descending order, while HashMap cannot  
Option C: HashMap allows duplicate keys, while TreeMap does not  
Option D: All of the above  
Correct Answer: D  
  
5. What is the purpose of the "extends" keyword in Java?  
Option A: To inherit a class's properties and methods from another class  
Option B: To create a new object of a class  
Option C: To override a method in a subclass  
Option D: To define an interface  
Correct Answer: A  
  
6. What is the difference between an interface and an abstract class?  
Option A: Interfaces cannot have any implemented methods, while abstract classes can  
Option B: Interfaces can have instance variables, while abstract classes cannot  
Option C: Abstract classes must be extended, while interfaces can be implemented or extended  
Option D: All of the above  
Correct Answer: D  
  
7. What is the purpose of the "final" keyword in Java?  
Option A: To prevent a method from being overridden in a subclass  
Option B: To prevent a class from being extended  
Option C: To prevent a variable from being modified  
Option D: All of the above  
Correct Answer: D  
  
8. What is the purpose of a static method?  
Option A: It is a method that can be called without creating an object of the class  
Option B: It is a method that can only be called from within the same class  
Option C: It can access instance variables of the class  
Option D: It cannot access instance variables of the class  
Correct Answer: A  
  
9. What is the difference between a shallow copy and a deep copy?  
Option A: A shallow copy creates a new object that references the same underlying data as the original, while a deep copy creates a new object that is independent of the original  
Option B: A deep copy creates a new object that references the same underlying data as the original, while a shallow copy creates a new object that is independent of the original  
Option C: A shallow copy is always more efficient than a deep copy  
Option D: A deep copy is always more efficient than a shallow copy  
Correct Answer: A  
  
10. What is the purpose of the "synchronized" keyword in Java?  
Option A: To ensure that only one thread can access a block of code at a time  
Option B: To ensure that multiple threads can access a block of code at the same time  
Option C: To create a new thread  
Option D: To terminate a thread  
Correct Answer: A  
  
11. What is the purpose of the "volatile" keyword in Java?  
Option A: To ensure that a variable is always read from main memory  
Option B: To ensure that a variable is always written to main memory  
Option C: To prevent a variable from being optimized by the compiler  
Option D: All of the above  
Correct Answer: D  
  
12. What is the difference between a stack and a heap?  
Option A: A stack is used to store local variables and method calls, while a heap is used to store objects  
Option B: A heap is used to store local variables and method calls, while a stack is used to store objects  
Option C: A stack is faster to access than a heap  
Option D: A heap is faster to access than a stack  
Correct Answer: A  
  
13. What is the purpose of a garbage collector?  
Option A: To automatically reclaim memory that is no longer in use  
Option B: To create new objects  
Option C: To delete objects  
Option D: To optimize the performance of the program  
Correct Answer: A  
  
14. What is the difference between a JVM and a JIT compiler?  
Option A: A JVM is a virtual machine that runs Java bytecode, while a JIT compiler translates bytecode into machine code at runtime  
Option B: A JIT compiler is a virtual machine that runs Java bytecode, while a JVM translates bytecode into machine code at runtime  
Option C: A JVM is always faster than a JIT compiler  
Option D: A JIT compiler is always faster than a JVM  
Correct Answer: A  
  
15. What is the purpose of a thread pool?  
Option A: To manage a pool of threads that can be used for concurrent tasks  
Option B: To create new threads  
Option C: To delete threads  
Option D: To optimize the performance of the program  
Correct Answer: A  
  
16. What is the difference between a semaphore and a mutex?  
Option A: A semaphore can be used to control access to shared resources, while a mutex can only be used to prevent multiple threads from accessing the same resource at the same time  
Option B: A mutex can be used to control access to shared resources, while a semaphore can only be used to prevent multiple threads from accessing the same resource at the same time  
Option C: A semaphore is always more efficient than a mutex  
Option D: A mutex is always more efficient than a semaphore  
Correct Answer: A  
  
17. What is the purpose of a deadlock?  
Option A: To prevent multiple threads from accessing the same resource at the same time  
Option B: To allow multiple threads to access the same resource at the same time  
Option C: To detect when a thread is waiting for a resource that is held by another thread  
Option D: To terminate a thread  
Correct Answer: C  
  
18. What is the purpose of a lock-free data structure?  
Option A: To allow multiple threads to access the data structure concurrently without the need for synchronization  
Option B: To prevent multiple threads from accessing the data structure concurrently  
Option C: To detect when a thread is waiting for access to the data structure  
Option D: To terminate a thread  
Correct Answer: A  
  
19. What is the difference between a producer-consumer problem and a reader-writer problem?  
Option A: In a producer-consumer problem, multiple producers produce data that is consumed by multiple consumers, while in a reader-writer problem, multiple readers read data that is written by multiple writers  
Option B: In a reader-writer problem, multiple producers produce data that is consumed by multiple consumers, while in a producer-consumer problem, multiple readers read data that is written by multiple writers  
Option C: A producer-consumer problem is always more difficult to solve than a reader-writer problem  
Option D: A reader-writer problem is always more difficult to solve than a producer-consumer problem  
Correct Answer: A  
  
20. What is the purpose of a distributed system?  
Option A: To allow multiple computers to work together to solve a problem  
Option B: To prevent multiple computers from working together to solve a problem  
Option C: To detect when a computer is not responding  
Option D: To terminate a computer  
Correct Answer: A  
  
21. What is the difference between a client-server architecture and a peer-to-peer architecture?  
Option A: In a client-server architecture, clients request services from a central server, while in a peer-to-peer architecture, all computers are equal and can both provide and consume services  
Option B: In a peer-to-peer architecture, clients request services from a central server, while in a client-server architecture, all computers are equal and can both provide and consume services  
Option C: A client-server architecture is always more efficient than a peer-to-peer architecture  
Option D: A peer-to-peer architecture is always more efficient than a client-server architecture  
Correct Answer: A  
  
22. What is the purpose of a firewall?  
Option A: To protect a computer or network from unauthorized access  
Option B: To allow unauthorized access to a computer or network  
Option C: To detect when a computer or network is under attack  
Option D: To terminate a computer or network  
Correct Answer: A  
  
23. What is the difference between a virus and a worm?  
Option A: A virus infects files, while a worm infects networks  
Option B: A worm infects files, while a virus infects networks  
Option C: A virus is always more harmful than a worm  
Option D: A worm is always more harmful than a virus  
Correct Answer: A  
  
24. What is the purpose of a honeypot?  
Option A: To attract and trap hackers  
Option B: To prevent hackers from attacking a computer or network  
Option C: To detect when a computer or network is under attack  
Option D: To terminate a hacker  
Correct Answer: A  
  
25. What is the difference between a vulnerability and an exploit?  
Option A: A vulnerability is