Final Revision

Note:

This document provides exercise questions for final revision of the Java Programming course. It doesn’t mean the final exam questions will be from these questions.

All other materials provided in the course, such as lecture notes, study guides and assignments should also be reviewed.

Solutions to these questions can be found from the textbook.

For the topics not listed in this document but covered in the course, please refer to other materials for revision.
Fundamentals

1. Consider the following statement:
   `String greeting = 13;`

   Which of the following is true?
   A) The statement yields neither a compile-time error nor a runtime error.
   B) The statement yields a compile-time error
   C) The statement yields a runtime error.
   D) The statement yields both a compile-time error and a runtime error.

2. Which of the following statements is correct?
   A) Identifiers can be made up of letters, digits, and the underscore (_) character.
   B) Identifiers can use symbols such as ? or %.
   C) Spaces are permitted inside identifiers.
   D) Identifiers are not case sensitive.

3. List three rules imposed by Java on identifiers.

4. It is an error to use the value of a variable that has never had a value assigned to it.
   A) True
   B) False

5. Which of the following code fragments will cause an error?
   A) `String greeting = "Hello, Dave!";`
   B) `PrintStream printer = System.out;`
   C) `String greeting = "Hello, World!";`
       `int n = greeting.length();`
   D) `int luckyNumber;`
       `System.out.println(luckyNumber);`

6. Which of the following statements is correct in the Java language?
   A) All entities, even numbers, are objects.
   B) Objects are stored in object variables.
   C) Every object belongs to a class.
   D) An object defines the methods for a class.

7. Which of the following counts the number of characters in a string?
   `String greeting = "Hello, World!";`

   A) `int n = greeting.length();`
   B) `int n = greeting.count();`
C) int n = greeting.size();
D) int n = greeting.number();

8. Write a statement that sets the value of i to the number of characters in the following string:

```java
int i;
String message = "Go home early today.";
```

9. A method name is ____________________ if a class has more than one method with that name (but different parameter types).

10. In Java, numbers are objects of classes in the java.lang package.
    A) True
    B) False

11. Based on the code below, move the rectangle 25 units to the left and 40 units down.

```java
Rectangle box = new Rectangle(5, 10, 20, 30);
```

12. An object can be referenced by at most one object variable.
    A) True
    B) False

13. Which of the following terms denotes the memory location of an object?
    A) implicit parameter
    B) mutator method
    C) object reference
    D) encapsulation

14. Complete this code fragment to ensure that the frame is shown.

```java
JFrame frame = new JFrame();
__________
A) frame.visible = true;
B) frame.setVisible();
C) frame.setVisible(true);
D) JFrame.setVisible();
```

15. Complete this code fragment to ensure that the application exits properly when the user closes the frame.

```java
JFrame frame = new JFrame();
__________
A) JFrame.setCloseOperation(JFrame.EXIT);
```
B) frame.setCloseOperation(JFrame.EXIT);
C) JFrame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
D) frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);

16. Complete the following code fragment by writing two statements that would cause a program to display a square frame with a title that reads "My first GUI program."

```
JFrame frame = new JFrame();
final int FRAME_WIDTH = 400;
final int FRAME_HEIGHT = 400;
        ______
        ______
frame.setVisible(true);
```

17. _______________ is the nickname for the graphical user interface library in Java.

18. To run an applet, you need a(n) ________ file with the applet tag.

19. You view applets with the ________ or a Java enabled browser.

20. Which of the following code fragments converts a floating-point number to the nearest integer?
   A) double f = 4.65;
      int n = (int) Math.round(100 * f);
   B) double f = 4.65;
      int n = (int) Math.round(f);
   C) double f = 4.65;
      int n = Math.round(f);
   D) double f = 4.65;
      int n = (int) f;

21. Which of the following primitive types is a floating-point type with a size of eight bytes?
   A) float
   B) double
   C) short
   D) long

22. Which of the following primitive types has a size of two bytes?
   A) int
   B) byte
   C) long
   D) char
23. Which of the following code fragments will compile without error?
   A) int balance = (double) 100;
   B) int dollars = 100;
      double balance = dollars;
   C) double balance = 13.75;
      int dollars = balance;
   D) (int) balance = 13.75

24. Consider this code fragment.

   double balance = 13.75;
   int dollars = balance;

   Which of the following statements is true?
   A) The code compiles and runs correctly, setting dollars to 13.
   B) The code compiles but it sets dollars to the nearest integer, 14.
   C) The code compiles but it sets dollars to a wrong value due to a roundoff error.
   D) The code doesn't compile.

25. Which of the following correctly defines a constant in a method?
   A) final double NICKEL_VALUE == 0.05;
   B) public static final double LITERS_PER_GALLON = 3.785;
   C) final double NICKEL_VALUE = 0.05;
   D) public static final double LITERS_PER_GALLON == 3.785

26. Numerical ____________________ are values that do not change and that have a special significance for a computation.

27. Which of the following statements is equivalent to balance = balance + amount; ?
   A) balance += amount;
   B) balance =+ amount;
   C) balance == amount;
   D) balance +== amount;

28. The value of x after the following sequence of statements is ____________________.
    x--; x++;

29. Consider this statement for computing the average of x, y, and z.

    double average = x + y + z / 3;
Which of the following statements is correct?
A) The code always computes the correct average.
B) The code works correctly provided x, y, and z are variables of type double
C) The code works correctly provided x, y, and z are variables of type int
D) The code only gives the right answer when \( x = -y \)

30. A string is a sequence of ____________________.

31. Convert the following string to its floating-point value as price:
   ```java
   String input = "75.23";
   
   ```

32. The ____________________ character is used as an escape character in Java.

33. Java uses the ____________________ encoding scheme to encode international characters.

34. Based on the code below, write a statement that copies all characters after the comma to the string sub.
   ```java
   String greeting = "Hello, World!";
   
   ```

35. What is the purpose of the Scanner class?

36. Write the Java version of the following pseudocode: If the student's grade is between 60 and 70 (inclusive), print "C"

37. Which of the following is a relational operator?
   A) &&
   B) ||
   C) !=
   D) /

38. The length of an empty string is ____________________.

39. You should use the ____________________ operator to test whether an object reference is a null reference.

40. Java has ____ relational operators.
   A) 3
   B) 5
   C) 6
   D) 8
41. The ____ method compares strings in dictionary order.
   A) compareDict
   B) compare
   C) equals
   D) compareTo

42. If the test: \( s \text{.compareTo}(t) < 0 \) is true, then ____.
   A) \( s \) and \( t \) are equivalent
   B) \( s \) comes before \( t \) in the dictionary
   C) \( t \) is null
   D) \( s \) comes after \( t \) in the dictionary

43. If \( \text{string1}\text{.compareTo(string2)} \) __________________, then \( \text{string1} \) and \( \text{string2} \) are equal.
   A) == 0
   B) != 0
   C) == true
   D) != null

44. The __________________ reference indicates that a string variable refers to no string at all.

45. The __________________ type has two values: true and false.

46. A(n) ____ method returns a boolean value.
   A) predicate
   B) complex
   C) abstract
   D) equals

47. Boolean variables are sometimes called ____ , because they can have only two states: "up" and "down."
   A) flags
   B) short circuits
   C) references
   D) lazy expressions
48. An enumerated type variable can have ___
   A) an infinite number of values
   B) a finite number of predetermined values, or null
   C) a finite number of predetermined values but not null
   D) only the values SINGLE, MARRIED, and null

49. The following code fragment is an example of a ___ method.

   ```java
   public boolean hasAvailableFunds()
   {
     return balance >0;
   }
   ```
   A) relational
   B) conditional
   C) predicate
   D) static

50. Which of the following conditions does not test whether \( x \) is between 1 and 10 (inclusive)?

   A) \( 1 \leq x \land x \leq 10 \)
   B) \( \neg(x < 1 \lor 10 < x) \)
   C) \( \neg(x \leq 1 \lor x \geq 10) \)
   D) \( 10 \geq x \land x \geq 1 \)

51. In Java, the more specialized class that inherits from the superclass is called the
    ____________________________.

52. The ________________________ keyword is used in Java for deriving a subclass from an
    existing class.

53. ________________________ is the ability to define a new class using an existing class as the
    basis.

54. How does inheritance differ from the implementation of an interface?

55. What is the difference between a superclass and a subclass?

56. In Java, a class that is defined without an explicit `extends` clause
    A) has no superclass
    B) is a subclass of Object
    C) is its own superclass
    D) is a syntax error
57. Use the ____________________ keyword to call a method of the superclass.

58. The ____________________ keyword is used to deactivate polymorphism and invoke a method of the superclass.

59. Which of the following statements is correct?
   A) The toString() method tests whether or not an object is a string.
   B) If you define a method that did not exist in the superclass, then the new method can be applied only to subclass objects.
   C) Instance fields can be accessed with the super keyword.
   D) Instance fields can be overridden.

60. The ____________________ operator tests whether an object belongs to a particular type.

61. Given the variables
   Object obj;
   BankAccount ba;
   SavingsAccount sa;
   String str;

   which of the following assignments is not legal?
   A) ba = sa;
   B) sa = str;
   C) obj = str;
   D) obj = sa;

62. All object references can be converted to the type ___ without requiring a cast.

63. The ____ is called whenever you want to compare whether two objects have the same contents.
   A) equalTo method
   B) equals method
   C) == operator
   D) isEqual method

64. The ____________________ method returns a string representation for each object.

65. The return type of the clone method is the class ____________________.

66. The statement that adds a scroll bar to the following text area is ________________.
   JTextArea textArea = new JTextArea(ROWS, COLUMNS);
GUI

67. To create a(n) _________________ layout, you supply the number of rows and columns in the constructor, then add the components, row by row, left to right.

68. When adding a component to a container with the _________________ layout, specify the NORTH, EAST, SOUTH, WEST, or CENTER position.

69. In Java, each container has its own _________________, which determines how the components are laid out.

70. By default, a JPanel uses a(n) _________________ layout.

71. If you want to have a tabular arrangement of components, in which columns have different sizes or one component spans multiple columns, a(n) ____ would be appropriate.  
   A) grid bag layout  
   B) grid layout  
   C) flow layout  
   D) border layout

72. Based on the following code, the statement that would add smallButton to the button group is ________________.

```java
JRadioButton smallButton = new JRadioButton("Small");
ButtonGroup group = new ButtonGroup();
```

73. Which of the following adds a border to the following panel?

```java
JPanel panel = new JPanel();
A) panel.addEtchedBorder();
B) panel.addBorder(new EtchedBorder());
C) panel.add(new EtchedBorder());
D) panel.setBorder(new EtchedBorder());
```

74. Based on the statement below, which of the following adds a title to the border?

```java
JPanel panel = new JPanel();
A) panel.setBorder(new TitledBorder());
B) panel.setBorder(new TitledBorder(new EtchedBorder(), "Size");
C) panel.setBorder(new TitledBorder(new EtchedBorder()));
D) panel.setTitle("Size");
```
75. A(n) ____ is a combination of a list and a text field.
   A) radio button
   B) combo box
   C) check box
   D) scroll bar

76. When the user selects a menu items, the menu item sends a(n) ________________.

77. When a menu item is selected, it sends an event of type
   A) ActionEvent
   B) ChangeEvent
   C) ItemEvent
   D) SelectionEvent

78. What is wrong with the following code?

```java
class ExitListener implements ActionListener {
    public void actionPerformed(ActionEvent event) {
        System.exit(0);
    }
}
```

   A) The ExitListener class is not public
   B) You cannot attach a listener to a menu, only to a menu item
   C) You cannot add a menu to the menu bar, only a menu item
   D) You need to use a menu listener, not an action listener

79. Complete the following code that attaches a menu named File with menu items named Open and Save to the menu bar of a frame.

```java
ActionListener openListener = new FileOpenListener();
ActionListener saveListener = new FileSaveListener();
JMenuBar menuBar = frame.getJMenuBar();
// your work here
```
Arrays and Array Lists

80. Based on the following statement, `primes[3] = ____________________.`
   `int[] primes = {2, 3, 5, 7, 11};`

81. Based on the following code, which of the following statements correctly prints the third value of the array, that is, the value 9?
   `int[] squares = { 1, 4, 9, 16, 25, 36 };`
   A) `System.out.println(squares.get(2));`
   B) `System.out.println(squares.get(3));`
   C) `System.out.println(squares[2]);`
   D) `System.out.println(squares[3]);`

82. Based on the code below, which of the following correctly iterates over the elements of the array and prints them?
   `int[] arrayOfInts = { 32, 87, 3, 589, 12, 1076, 2000, 8, 622, 127 };`
   A) `for (int i = 0; i < arrayOfInts.length(); i++)
      System.out.print(arrayOfInts[i] + " ");`
   B) `for (int i = 0; i < arrayOfInts.length; i++)
      System.out.print(arrayOfInts[i] + " ");`
   C) `for (int i = 0; i < arrayOfInts.size(); i--)
      System.out.print(arrayOfInts[i] + " ");`
   D) `for (int i = 0; i < arrayOfInts.size; i++)
      System.out.print(arrayOfInts[i] + " ");`

83. Arrays suffer from a significant limitation: ____.
   A) index values range from 0 to length + 1
   B) you cannot determine the number of elements in the array
   C) you cannot copy values from one array to another
   D) their length is fixed

84. When an array is first created, all elements are initialized with ____.
   A) zero
   B) null
   C) a fixed value that depends on the element type
   D) random values

85. What is the error in this code fragment?
   `double[] data;
   data[0] = 15.25;`
86. To treat primitive type values as objects, you must use ________________ classes.

87. The wrapper class for the primitive type double is ________________.

88. How many wrapper classes are there in Java?
   A) 6
   B) 8
   C) 10
   D) 12

89. Wrapper objects can be used anywhere that objects are required instead of ____.
   A) generic classes
   B) clone methods
   C) primitive data types
   D) array lists

90. Rewrite the following loop as a traditional for loop, assuming that ArrayList<String> names has been initialized.

   for (String s : names) System.out.println(s);

91. What does this max/min loop compute?

   double b = accounts.get(0).getBalance();
   for (int i = 1; i < accounts.size(); i++)
   {
       BankAccount a = accounts.get(i);
       if (a.getBalance() < b)
           b = a.getBalance();
   }
   return b;

   A) The value of the largest balance
   B) The bank account with the largest balance
   C) The value of the smallest balance
   D) The bank account with the smallest balance

92. The following search process is called a(n) ________________ search through the array list.
public class Bank
{
    public BankAccount find(int accountNumber)
    {
        for (BankAccount a : accounts)
        {
            if (a.getAccountNumber() == accountNumber) // Found a match
                return a;
        }
        return null; // No match in the entire array list
    }
    ...
}

93. The code below yields a two-dimensional array with ______________ elements.

    final int ROWS = 4;
    final int COLUMNS = 3;
    String[][] board = new String[ROWS][COLUMNS];
94. The `Runnable` interface has a single method called ________________.

95. The ________________ interface is designed to encapsulate the concept of a sequence of statements that can run in parallel with other tasks, without equating it with the concept of a thread, a potentially expensive resource that is managed by the operating system.

96. The ________________ method puts the current thread to sleep for a given number of milliseconds.

97. When a thread is interrupted, the most common response is to terminate the ________________ method.

98. When a sleeping thread is interrupted, a(n) ________________ is generated.

99. To start a thread, you should first construct an object from a class that implements the ________________ interface.

100. Insert the statement that would start the following thread.

```java
Thread firstThread = new Thread(myRunnable);
____________________
```

101. Each thread runs for a short amount of time, called a(n) ________________.

102. Explain the difference between the “Runnable” state and the “Running” state that a thread may be in.

103. Suppose that the class `XYZ` implements the interface `Runnable`. Use `XYZ` to create a thread object and make it available to the scheduler to be executed.

104. What happens if we try to start a thread that is an instance of a subclass of `Thread` that did not override the `run` method?

105. Explain the difference between the `start` method and the `run` method for a thread.

106. The ________________ method does not actually cause threads to terminate; it merely sets a boolean field in the thread data structure.
107. Write a code fragment that will put the thread that executes it to sleep for eight seconds.

108. _____ occur if the effect of multiple threads on shared data depends on the order in which the threads are scheduled.
   A) Pooling
   B) Interrupted exceptions
   C) Deadlocks
   D) Race conditions

109. A(n) _____ object is used to control the threads that want to manipulate a shared resource.
   A) condition
   B) lock
   C) interrupt
   D) runnable

110. Consider the addFirst method of the LinkedList class

```java
/**
   * Adds an element to the front of the linked list.
   * @param element the element to add
   */
   public void addFirst(Object element) {
       Node newNode = new Node();
       newNode.data = element;
       newNode.next = first;
       first = newNode;
   }
```

111. Three implementations have been proposed to make the addFirst method threadsafe.

I.
```java
listLock.lock();
try {
    Node newNode = new Node();
    newNode.data = element;
    newNode.next = first;
} finally {
    listLock.unlock();
}
first = newNode;
```

II.
```java
Node newNode = new Node();
newNode.data = element;
newNode.next = first;
```
listLock.lock();
try
{
    first = newNode;
}
finally
{
    listLock.unlock();
}

III.
listLock.lock();
try
{
    Node newNode = new Node();
    newNode.data = element;
    newNode.next = first;
    first = newNode;
}
finally
{
    listLock.unlock();
}

Which of them will work?
A) None of them
B) III only
C) II and III only
D) All of them

112. If a thread sleeps after acquiring a(n) ____________________, it blocks all other threads that want to use the same lock.

113. __________________ is called by a thread that has just changed the state of some shared data in a way that may benefit waiting threads.

114. ____ allow a thread to temporarily release a lock, so that another thread can proceed, and to regain the lock at a later time.
A) Condition objects
B) Embedded systems
C) Exceptions
D) Race conditions

115. A waiting thread is blocked until another thread calls ____ on the condition object for which the thread is waiting.
A) await
116. Which of the following statements is correct?

A) If a thread sleeps after acquiring a lock, it blocks all other threads that want to use the same lock.
B) When a thread calls `await`, it is simply deactivated in the same way as a thread that reaches the end of its time slice.
C) A thread pool is designed to encapsulate the concept of a sequence of statements that can run in parallel with other tasks, without equating it with the concept of a thread, a potentially expensive resource that is managed by the operating system.
D) Under no circumstances should you terminate a running thread.

117. What is the difference between a deadlock and a race condition?

118. Explain what `deadlock` means in a program that has multiple threads.