Questions 1 – 40 worth 2 points each for total of 80
Questions 41 – 42 worth 10 points each for total of 20
Total exam worth 100 points

1. Which of the following statements are correct?
   a. char[][] charArray = {'a', 'b'};
   b. char[][2] charArray = {{'a', 'b'}, {'c', 'd'}};
   c. char[][2] charArray = {{'a', 'b'}, {'c', 'd'}};
   d. char[][] charArray = {{'a', 'b'}, {'c', 'd'}};

2. Assume int[][] x = {{1, 2}, {3, 4}, {5, 6}}, what are x.length and x[0].length?
   a. 2 and 1
   b. 2 and 2
   c. 3 and 2
   d. 2 and 3
   e. 3 and 3

3. What is the output of the following code?
   ```java
   public class Test {
       public static void main(String[] args) {
           int[][] matrix =
               {{1, 2, 3, 4},
                {4, 5, 6, 7},
                {8, 9, 10, 11},
                {12, 13, 14, 15}};

           for (int i = 0; i < 4; i++)
               System.out.print(matrix[i][1] + " ");
       }
   }
   ```
   a. 1 2 3 4
   b. 4 5 6 7
   c. 1 3 8 12
   d. 2 5 9 13
   e. 3 6 10 14
4. What is the output of the following code?
   public class Test5 {
       public static void main(String[] args) {
           int[][] matrix =
               {{1, 2, 3, 4},
                {4, 5, 6, 7},
                {8, 9, 10, 11},
                {12, 13, 14, 15}};

           for (int i = 0; i < 4; i++)
               System.out.print(matrix[1][i] + " ");
       }
   }

   a. 1 2 3 4
   b. 4 5 6 7
   c. 1 3 8 12
   d. 2 5 9 13
   e. 3 6 10 14

5. Suppose a method p has the following heading:
   public static int[][] p()

   What return statement may be used in p()?
   a. return 1;
   b. return {1, 2, 3};
   c. return int[][]{1, 2, 3};
   d. return new int[][]{1, 2, 3};
   e. return new int[][]{{1, 2, 3}, {2, 4, 5}};

6. Which of the following statements are correct?
   a. char[][][] charArray = new char[2][2][];
   b. char[2][2][] charArray = {'a', 'b'};
   c. char[][][] charArray = {{'a', 'b'}, {'c', 'd'}, {'e', 'f'}};
   d. char[][][] charArray = {{'a', 'b'}, {'c', 'd'}, {'e', 'f'}};

7. _______ is a construct that defines objects of the same type.
   a. A class
   b. An object
   c. A method
   d. A data field

8. Which of the following statements are true?
   a. Multiple constructors can be defined in a class.
   b. Constructors do not have a return type, not even void.
   c. Constructors must have the same name as the class itself.
   d. Constructors are invoked using the new operator when an object is created.
9. **Analyze the following code:**

```java
public class Test {
    public static void main(String[] args) {
        A a = new A();
        a.print();
    }
}

class A {
    String s;

    A(String s) {
        this.s = s;
    }

    void print() {
        System.out.println(s);
    }
}
```

a. The program has a compilation error because class A is not a public class.
b. The program has a compilation error because class A does not have a default constructor.
c. The program compiles and runs fine and prints nothing.
d. The program would compile and run if you change A a = new A() to A a = new A("5").

10. Variables that are shared by every instances of a class are _________.
    a. public variables
    b. private variables
    c. instance variables
    d. class variables
11. What is the printout of the third println statement in the main method?

```java
public class Foo {
    int i;
    static int s;
    public static void main(String[] args) {
        Foo f1 = new Foo();
        System.out.println("f1.i is "+ f1.i + " f1.s is "+ f1.s);
        Foo f2 = new Foo();
        System.out.println("f2.i is "+ f2.i + " f2.s is "+ f2.s);
        Foo f3 = new Foo();
        System.out.println("f3.i is "+ f3.i + " f3.s is "+ f3.s);
    }
    public Foo() {
        i++;
        s++;
    }
}
```

a. f3.i is 1 f3.s is 1
b. f3.i is 1 f3.s is 2
c. f3.i is 1 f3.s is 3
d. f3.i is 3 f3.s is 1
e. f3.i is 3 f3.s is 3

12. Which of the following statements are true?
   a. Use the private modifier to encapsulate data fields.
   b. Encapsulating data fields makes the program easy to maintain.
   c. Encapsulating data fields makes the program short.
   d. Encapsulating data fields helps prevent programming errors.

13. What is the output of the following code?

```java
public class Test {
    public static void main(String[] args) {
        String s1 = "Welcome to Java!";
        String s2 = s1;

        if (s1 == s2)
            System.out.println("s1 and s2 reference to the same String object");
        else
            System.out.println("s1 and s2 reference to different String objects");
    }
}
```

a. s1 and s2 reference to the same String object
b. s1 and s2 reference to different String objects
14. Suppose s is a string with the value "java". What will be assigned to x if you execute the following code?
   ```java
   char x = s.charAt(4);
   ```
   a. ‘a’
   b. ‘v’
   c. Nothing will be assigned to x, because the execution causes the runtime error `StringIndexOutOfBoundsException`.

15. Suppose s1 and s2 are two strings. Which of the following statements or expressions are incorrect?
   a. String s = new String("new string");
   b. String s3 = s1 + s2
   c. s1 >= s2
   d. int i = s1.length
   e. s1.charAt(0) = '5'

16. What is the return value of "SELECT".substring(0, 5)?
   a. "SELECT"
   b. "SELEC"
   c. "SELE"
   d. "ELECT"

17. Which of the following is true?
   a. You can add characters into a string buffer.
   b. You can delete characters into a string buffer.
   c. You can reverse the characters in a string buffer.
   d. The capacity of a string buffer can be automatically adjusted.

18. Which code fragment would correctly identify the number of arguments passed via the command line to a Java application, excluding the name of the class that is being invoked?
   a. int count = args.length;
   b. int count = args.length - 1;
   c. int count = 0; while (args[count] != null) count ++;
   d. int count=0; while (!(args[count].equals(""))) count ++;

19. Which of the following statements are true about an immutable object?
   a. The contents of an immutable object cannot be modified.
   b. All properties of an immutable object must be private.
   c. All properties of an immutable object must be of primitive types.
   d. An object type property in an immutable object must also be immutable.
   e. An immutable object contains no mutator methods.
20. What is the printout for the second statement in the main method?
```java
public class Foo {
    static int i = 0;
    static int j = 0;
    public static void main(String[] args) {
        int i = 2;
        int k = 3;
        {
            int j = 3;
            System.out.println("i + j is " + i + j);
        }
        k = i + j;
        System.out.println("k is " + k);
        System.out.println("j is " + j);
    }
    }
    a. k is 0
    b. k is 1
    c. k is 2
    d. k is 3
```

21. You can declare two variables with the same name in __________.
   a. a method one as a formal parameter and the other as a local variable
   b. a block
   c. two nested blocks in a method (two nested blocks means one being inside the other)
   d. different methods in a class

22. Analyze the following code:
```java
class Test {
    private double i;
    public Test(double i) {
        this.t();
        this.i = i;
    }
    public Test() {
        System.out.println("Default constructor");
        this(1);
    }
    public void t() {
        System.out.println("Invoking t");
    }
}
```
   a. this.t() may be replaced by t().
   b. this.i may be replaced by i.
   c. this(1) must be called before System.out.println("Default constructor").
   d. this(1) must be replaced by this(1.0).
23. Object-oriented programming allows you to derive new classes from existing classes. This is called ____________.
   a. Encapsulation
   b. Inheritance
   c. Abstraction
d. Generalization

24. Suppose you create a class Cylinder to be a subclass of Circle. Analyze the following code:
   ```java
class Cylinder extends Circle {
    double length;
    Cylinder(double radius) {
      Circle(radius);
    }
}
```
   a. The program compiles fine, but you cannot create an instance of Cylinder because the constructor does not specify the length of the cylinder.
b. The program has a compile error because you attempted to invoke the Circle class's constructor illegally.
c. The program compiles fine, but it has a runtime error because of invoking the Circle class's constructor illegally.

25. Which of the statements regarding the super keyword is incorrect?
   a. You can use super to invoke a super class constructor.
b. You can use super to invoke a super class method.
c. You can use super.super.p to invoke a method in superclass's parent class
d. You cannot invoke a method in superclass's parent class.

d. Dynamic binding can apply to static methods.
ed. Dynamic binding can apply to instance methods.

27. You can assign __________ to a variable of Object[] type.
   a. new char[100]
b. new int[100]
c. new double[100]
d. new String[100]e. new java.util.Date[100]

28. What modifier should you use on a class so that a class in the same package can access it but a class in a different package cannot access it?
   a. Public
   b. Private
c. Protected
d. Use the default modifier.
29. The coordinate of the upper-left corner of a frame is _________.
   a. (0, 0)
   b. (25, 25)
   c. (100, 100)
   d. (10, 10)

30. Which of the following statements are true?
   a. Each GUI component contains a Graphics object that can be obtained using getGraphics() method.
   b. Once a GUI component is visible, getGraphics() returns the object.
   c. If a GUI component is not visible, getGraphics() returns null.
   d. The Graphics object is automatically created for each visible GUI component.

31. To draw graphics, it is better to define a class that extends ________ and override the paintComponent method.
   a. JLabel
   b. JButton
   c. JPanel
   d. JComponent

32. Given a Graphics object g, to draw a line from the upper left corner to the bottom right corner, you use __________.
   a. g.drawLine(0, 0, 100, 100)
   b. g.drawLine(0, 0, getWidth(), getHeight())
   c. g.drawLine(0, 0, getHeight(), getHeight())
   d. g.drawLine(0, 0, getWidth(), getWidth())

33. Given a Graphics object g, to draw a polyline to connect points (3, 3), (4, 10), (10, 20), (2, 100), you use __________.
   a. g.drawPolyline(new int[]{3, 4, 10, 2}, new int[]{3, 10, 20, 100}, 4)
   b. g.drawPolyline((3, 4, 10, 2), (3, 10, 20, 100), 4)
   c. g.drawPolygon(new int[]{3, 4, 10, 2}, new int[]{3, 10, 20, 100}, 4)
   d. g.drawPolygon({3, 4, 10, 2}, {3, 10, 20, 100}, 4)

34. Pressing a button generates a(n) __________ event.
   a. ItemEvent
   b. MouseEvent
   c. MouseMotionEvent
   d. ActionEvent
   e. ContainerEvent

35. Which statement is true about a non-static inner class?
   a. It must implement an interface.
   b. It is accessible from any other class.
   c. It can only be instantiated in the enclosing class.
   d. It must be final if it is declared in a method scope.
   e. It can access private instance variables in the enclosing object.

36. Which of the following are correct names for listener adapters?
   a. ActionAdapter
   b. MouseAdapter
   c. KeyAdapter
   d. WindowAdapter
37. Analyze the following code.
    import java.awt.*;
    import java.awt.event.*;
    import javax.swing.*;
    public class Test extends JFrame implements ActionListener {
        public Test() {
            JButton jbtOK = new JButton("OK");
            getContentPane().add(jbtOK);
        }
        public void actionPerformed(ActionEvent e) {
            System.out.println("The OK button is clicked");
        }
        public static void main(String[] args) {
            JFrame frame = new Test();
            frame.setSize(300, 300);
            frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
            frame.setVisible(true);
        }
    }

    a. The program has a compile error because no listeners are registered with jbtOK.
    b. The program has a runtime error because no listeners are registered with jbtOK.
    c. The message "The OK button is clicked" is displayed when you click the OK button.
    d. The actionPerformed method is not executed when you click the OK button, because no instance of Test is registered with jbtOK.
    e. None of the above.

38. To listen to mouse clicked events, the listener must implement the _________ interface or extend the ______ adapter.

    a. MouseListener/MouseAdapter
    b. MouseMotionListener/MouseMotionAdapter
    c. WindowListener/WindowAdapter
    d. ComponentListener/ComponentAdapter

39. The listener's _________ method is invoked after a mouse button is pressed (but not released yet).

    a. public void mousePressed(MouseEvent e)
    b. public void mouseReleased(MouseEvent e)
    c. public void mouseEntered(MouseEvent e)
    d. public void mouseExited(MouseEvent e)
    e. public void mouseClicked(MouseEvent e)
40. Fill in the code to complete the following method for checking whether a string is a palindrome.
   public static boolean isPalindrome(String s) {
       return isPalindrome(s, 0, s.length() - 1);
   }

   public static boolean isPalindrome(String s, int low, int high) {
       if (high <= low) // Base case
           return true;
       else if (s.charAt(low) != s.charAt(high)) // Base case
           return false;
       else
           return ______________________________;
   }

   a. isPalindrome(s)
   b. isPalindrome(s, low, high)
   c. isPalindrome(s, low + 1, high)
   d. isPalindrome(s, low, high - 1)
   e. isPalindrome(s, low + 1, high - 1)

41. Fill in the code to complete the following method for computing factorial.

   /** Return the factorial for a specified index */
   public static long factorial(int n) {
       if (n == 0) // Base case
           return 1;
       else
           return _______________; // Recursive call
   }

42. Fill in the code to complete the following program:

   import ________________ //(1)

   public class Swing_Create_Frame{
       public static void main(String[] args){
           JFrame frame = new JFrame("Frame in Java Swing");
           frame.setSize(400, 400);
           ____________________ // (2)
           frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
       }
   }
Practice Exam Final Key

1. D
2. C
3. D
4. B
5. E
6. AD
7. A
8. ABCD
9. BD
10. D
11. C
12. ABD
13. A
14. C
15. CDE
16. B
17. ABCD
18. A
19. ABDE
20. C
21. D
22. C
23. B
24. B
25. C
26. ABCE
27. DE
28. D
29. A
30. ABCD
31. C
32. B
33. A
34. D
35. E
36. BCD
37. D
38. A
39. A
40. E

41. \( n \times \text{factorial}(n - 1) \) or \( \text{factorial}(n - 1) \times n \)

42. (1) `javax.swing.*`;
   (2) `frame.setVisible(true);`