I. Fill in the Blank (30 pts)

1. In order to use an interface, a class definition uses the keyword _______.

2. A ________ is a special class that is meant to encapsulate a primitive so that it can be used in places that require objects.

3. ________ is a special feature that allows primitives to be automatically encapsulated into a special class without us having to create an instance of that class.

4. ________ refers to a dynamic binding that takes place at runtime between a method call and implementation.

5. The method ________ is found in the ActionListener interface.

6. A ________ is a separate line of execution.

7. If a subclass contains a class method with the same signature and return type as one in its immediate superclass, then the method from the superclass is ________ in the subclass.

8. ________ is a layout manager that arranges components on a container from left to right.

9. If a class is declared ________, it cannot be extended.

10. The method ________ is found in the ItemListener interface.

11. The ________ package is automatically imported.

12. We use the ________ method to get a reference to the URL where the .class file of an applet is found.

13. The class ________ implements the methods in the MouseListener interface so that we can extend it and only override the methods we want.
14. We call the components in the java.awt package components because they rely heavily on their underlying platform.

15. The method is executed each time a user returns to a page containing an applet.

16. involves creating new classes by extending existing class definitions and adding additional functionality.

17. If A extends B, then A is a of B, and B is a of A.

18. We use the keyword to implement inheritance.

19. We use the method on an AudioClip to play it once.

20. The class is the only one in the Java language that doesn’t have a superclass.

21. Thread and any class that wants to be able to run implements the interface.

22. The method is the first method executed when an applet begins executing and only executes once.

23. In order to refer to itself, an object can use the keyword .

24. A class that is is incomplete, and we can’t create an instance of it.

25. If we have a subclass of Component and we want to draw a circle on that Component so that it touches each edge of the component, we would use the line
   g.drawOval(0,0,
   ).

26. If a variable is declared with the keyword, then they can be accessed in the same class, same package, and any subclass.

27. If a local variable in an instance method has the same name as an instance variable in the class definition, then the local variable is said to the instance variable.

28. A subclass can refer to its immediate superclass with the keyword .
II. Matching (10 pts)

29. valid applet tag  ____  A. Allows an entity to be accessed anywhere

30. single inheritance  ____  B. A relationship that allows instances of B to be treated as if they are instances of A if A extends B

31. shutdown hook  ____  C. A cane which is used to break a computer which won’t work

32. public String toString()  ____  D. In an event handler returns a reference to the component that caused an event to occur

33. no access control keyword  ____  E. Changing the implementation of an overridden instance method

34. method overriding  ____  F. Means that we can only list one class after the keyword extends

35. getSource()  ____  G. An unstarted thread that will be executed before the virtual machine shuts down

36. getDocumentBase()  ____  H. An inheritance that can’t be used by married people

37. autounboxing  ____  I. A relationship that allows instances of A to be treated as if they are instances of B if A extends B

38. “is a”  ____  J. Contains only the applet name

K. Contains the name of the applet, the width, and the height

L. In medical programs returns the source of a disease

M. A method that has to be defined in a class before it can be used

N. Allows an entity to be accessed in the same class, same package, and any subclass

O. Allows an entity to be accessed in the same class and same package

P. Allows a primitive to be automatically encapsulated into its corresponding wrapper class

Q. Returns a reference to the URL where the .html file that loaded an applet is located

R. Involves more than one method in a class definition with the same name

S. Automatically extracts a primitive from its wrapper class

T. A method inherited by all classes from Object which returns the String representation of an object

U. A method to display the lyrics of the Brady Bunch and Joanie loves Chachi theme songs

V. Returns a reference to the URL where the .class file for an applet is found
III. Short Answer (20 pts)

39. (2 pts) Does polymorphism apply to both instance methods and class methods? Explain.

40. (2 pts) Which of the following are valid assignments and why?

Object o = new String();  
String s = new Object();

41. (2 pts) Will the following cause a compile-time or runtime error? Explain.

Object o = new Object();  
Thread t = (Thread)o;

42. (2 pts) What can we not do with an abstract class?

43. (2 pts) Suppose we create a JFrame with the following code in a main method.

JFrame frame = new JFrame(“Test”);  
frame.setSize(500,500);  
frame.setLayout(new FlowLayout());  
if (3 == 4)  
    frame.add(new JLabel(“Test”));  
else  
    frame.add(new JLabel(“Joanie”));

If this is the only code in the main method, what will show up on the frame when the program is run? Explain.
44. (2 pts) What is the initial sequence of execution when an applet is run in its context?

45. (2 pts) In the call `referenceName.methodName()`, if `methodName` is a class method, what determines which version of `methodName()` will be called?

46. (2 pts) In the call `referenceName.methodName()`, if `methodName` is an instance method, what determines which version of `methodName()` will be called?

47. (2 pts) Is the following allowed? Explain.

   ```java
   Double d = 1;
   ```

48. (2 pts) What are two example of heavyweight classes in the `javax.swing` package?
IV. Discussion (10 pts)

49. (3 pts) What are the requirements to create a truly immutable object?

50. (4 pts) What is the interface contract?

51. (3 pts) What are two ways of creating a thread?
52. (5 pts) What is printed when the class Test is executed? Explain the output.

```java
public class Question52 {
    public void print() { System.out.println("Question 52"); }
    public static void print1() { System.out.println("Question 52"); }
}
class Test extends Question52 {
    public void print() { System.out.println("Test"); }
    public static void print1() { System.out.println("Test"); }
    public static void main(String[] args) {
        Question52 question52 = new Test();
        Test test = new Test();
        question52.print();
        test.print();
        question52.print1();
        test.print1();
    }
}
```

53. (5 pts) What happens when you try to compile and execute the following program? Explain your answer.

```java
public abstract class Question53 implements Comparable {
    private int num;
    public Question53(int num) {
        this.num = num;
    }
    public int compareTo(Object o) {
        return(-1);
    }
    public static void main(String[] args) {
        Question53 question53 = new Question53(1);
        Question53 question532 = new Question53(2);
        System.out.println(question53.compareTo(question532));
    }
}
```
54. (5 pts) Is there a compile-time error in the following code? Will there be a runtime error? If not, then list all possible things that can be printed. You may use the back of each page of the exam and request more paper if you want. Explain your answer.

```java
import java.awt.*;
import javax.swing.*;
import java.awt.event.*;
public class Question54 extends JApplet implements ActionListener, ItemListener {
    private int count;
    public void init() {
        JButton button = new JButton("Test");
        getContentPane().add(button);
        button.addActionListener(this);
        JComboBox box = new JComboBox(new String[] {
            "0", "3.1415", "5", "7" });
        getContentPane().add(box);
        box.addItemListener(this);
    }
    public void actionPerformed(ActionEvent e) {
        System.out.println("Hello");
    }
    public void itemPerformed(ItemEvent e) {
        count++;
        System.out.println(count);
    }
}
```
55. (7.5 pts) Suppose you have a JApplet and you are overriding the paint method. Show the code that would draw a blue circle of radius 100 whose center is at the center point of the JApplet and draw a red triangle whose vertices are somewhere on the circle.

public void paint(Graphics g) {

}
56. (7.5 pts) Create an applet that contains one button labeled “Press Me” and a JTextField so that when the button is clicked a random String is placed into the JTextField. You should make the length of the String random too.