Part 1: Multiple Choice (90 points - 3 points per question)

(C) 1. What is the code running on JVM called?
   (A) bit-code (B) class code (C) byte-code (D) none of the above

(B) 2. a, b, and c are 3 integers and and a = -2, b = 5, c = 4. What is the value of a double variable d after running
   \( d = +(a - b) / c \% a + c * b; \)?
   (A) 18 (B) 19 (C) 20 (D) None of the above

(B) 3. Which is true?
   (A) In Java a global variable can be used by different classes. (B) Java uses Unicode character set.
   (C) In Java, Strings are mutable objects. (D) none of the above

(A) 4. Standard code libraries in Java are called: (A) packages (B) methods (C) classes (D) statements

(C) 5. What is the value of i after running i = 0; while (i++ <= 100); (A) 100 (B) 101 (C) 102 (D) none of the above

(A) 6. A method that is used to change the value of a variable in an object is a ________.
   (A) accessor (B) constructor (C) mutator (D) none of the above

(A) 7. Which will return if recursive(6) is invoked?
   ```java
   int recursive(int n) {
       if (n <= 1) return n;
       else return recursive(n - 1) + recursive(n - 2);
   }
   ```
   (A) 8 (B) 13 (C) 21 (D) none of the above

(B) 8. Given int a[][] = {1, 2, 1, 6, 8}, i = 1. What is the value of a[a[2 * i]] + a[i]?
   (A) 4 (B) 6 (C) 8 (D) none of the above

(D) 9. Consider an long, i and an long array, a. Which is the correct way to use the for each in Java?
   (A) for (long i : a) a = 0; (B) for each (long i : a[]) i = 0; (C) for (long i : a[]) i = 0; (D) None of the above

(B) 10. An ArrayIndexOutOfBounds error is a:
   (A) compiler error (B) run-time error (C) syntax error (D) none of the above

(A) 11. For 6.8 which method will return 6.0?
   (A) Math.ceil(6.8) (B) Math.floor(6.8) (C) Math.round(6.8) (D) None of the above

(B) 12. Which is the parent constructor of a class? (A) super() (B) parent() (C) upper() (D) None of the above

(B) 13. Which is not a member of Open Handset Alliance? (A) Acer (B) BlackBerry (C) Google (D) HTC

(D) 14. Which is the code name of Android 4.2.2? (A) Donut (B) Ice Cream Sandwich (C) Gingerbread (D) Jelly Bean

(A) 15. Which operating system is Android based on? (A) Linux (B) MacOS (C) Windows (D) None of the above

(C) 16. Which is an emulator configuration that lets you model an actual device?
   (A) ADT (B) APK (C) AVD (D) none of the above

(A) 17. Which is the file format used to distribute and install Android application?
   (A) ADT (B) APK (C) AVD (D) none of the above

(A) 18. Which contains the contents and behavior of your application?
   (A) layout.xml (B) main.xml (C) string.xml (D) AndroidManifest.xml

(D) 19. To monitor Android devices, which is used? (A) ADT (B) AVD (C) APK (D) DDMS

(B) 20. Which is not a purpose of XML?
   (A) XML can be used to store the document content of HTML. (B) XML is used to replace HTML.
   (C) XML can be used as a data exchange format. (D) XML can be used in electronic commerce.

(D) 21. Which layout arranges its children into rows and columns?
   (A) GridLayout (B) LinearLayout (C) RelativeLayout (D) TableLayout

(D) 22. Which send an INFO log message? (A) log.d() (B) log.e() (C) log.f() (D) none of the above

(A) 23. Which is correct way to create a variable ID txtA?
   (A) @+id/txtA (B) @txtA (C) @id/txtA (D) txtA

(C) 24. Which attribute is used to specify the button click event?
   (A) android:ButtonClick (B)android:Click (C) android:onClick (D) None of the above

(B) 25. Which input type is used to indicate a password?
   (A) password (B) textPassword (C) inputPassword (D) none of the above

(D) 26. Which function is used to set a layout resource defining the UI?
   (A) findViewById() (B) getView() (C) identifyView() (D) setContentView()

(C) 27. Which class is a view containing a quick little message for the user?
   (A) Dialog (B) Intent (C) Toast (D) View

(B) 28. Which is the resources types for images?
   (A) R.anim (B) R.drawable (C) R.menu (D) None of the above

(D) 29. Which is a widget similar to a drop-down list for selecting items?
   (A) Dropdown (B) ListItem (C) Scrollbar (D) Spinner

(A) 30. Which is used to fading things in and out in an animation XML file?
   (A) alpha (B) rotate (C) scale (D) None of the above
Part 2: Questions and Answers (50 points)

1. (a) (3 points) What is the main difference between a class and an object?
   (b) (3 points) How does Java code run across platforms?
   (c) (6 points) Explain static and instance methods. Give an example for each method respectively.

Ans:
(a) A class is a template that defines the variables and the methods common to all objects of a certain type where an object is an instance of a class. There is one class and many objects.
(b) Java code is compiled into a byte-code. This byte-code can run on any computer where there is Java virtual machine (JVM).
(c) i. A instance method is a method which must be invoked via an instance of a class.
   ii. A static method is a method which can be invoked via the name of the class in which they are defined.
      B. Math.ceil(3.6) is a static method.
      A class Point has a method str(). Point p; p.str(); where p.str() is a instance method.

2. (a) (4 points) Complete the following class for a point with constructors, accesors, and mutators.

   ```java
class Point {
    private double x, y;
}
```

(b) Use the above Point class to create a class for a triangle which contains three points.
   i. (6 points) Write the constructors, accessors, mutators for the class.
   ii. (3 points) Write a function that passes two points and returns the distance of these two points.
   iii. (5 points) Write a member function for the triangle class that returns the area of the triangle.

   ```java
class Point {
    private double x, y;
    Point(double _x, double _y) { setPoint(_x, _y); }
    public void setPoint(double _x, double _y) { x = _x; y = _y; }
    public double getX() { return x; }
    public double getY() { return y; }
}

class Triangle {
    private Point a, b, c;
    private double distance(Point a, Point b) {
        return Math.sqrt((a.getX() - b.getX()) * (a.getX() - b.getX()) +
                          (a.getY() - b.getY()) * (a.getY() - b.getY()));
    }
    public Triangle(Point _a, Point _b, Point _c) {
        setTriangle(_a, _b, _c);
    }
    public void setTriangle(Point _a, Point _b, Point _c) {
        a = _a; b = _b; c = _c;
    }
    public Point getA() { return a; }
    public Point getB() { return b; }
    public Point getC() { return c; }
    public double area() {
        double sa = distance(a, b), sb = distance(b, c), sc = distance(c, a);
        if (sa + sb > sc && sb + sc > sa && sc + sa > sb) {
            double s = (sa + sb + sc) / 2;
            return sqrt(s * (s - sa) * (s - sb) * (s - sc));
        } else return 0;
    }
};
```

3. (10 points) Illustrate Android architecture. List the four layers and at least two components in each layer.
4. (10 points) Illustrate state transitions of an activity.