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

(B) 1. Which statement is true?
(A) bool is a Java keyword. (B) $ is a valid Java identifier.
(C) Java supports multiple inheritance. (D) none of the above

(D) 2. Which statement is true?
(A) In Java all functions must have the return type. (B) In Java source code is compiled into bit code.
(C) In Java a cast can convert an integer value to a boolean value. (D) none of the above

(B) 3. a, b, c, and d are 4 integers and a = 1, b = -6, c = 8. What is the value of d after running d = c % ++a * c - a * b / a?
(A) 5 (B) 6 (C) 7 (D) none of the above

(C) 4. What is the value of i after running i = 2; while (i++ <= 8);: (A) 8 (B) 9 (C) 10 (D) none of the above

(D) 5. Standard code libraries in Java are called: (A) classes (B) methods (C) encapsulation (D) packages

(C) 6. A NullPointerException error is a: (C) compiler error (B) syntax error (C) runtime error (D) none of the above

(A) 7. Consider the following array: int[] a = {1, -2, 1, 6, 8}, i = 2. What is the value of a[a[i]] + a[i]?
(A) -1 (B) 1 (C) 2 (D) none of the above

(B) 8. Which is used to access the size of an array? (A) size (B) length (C) sizeof (D) none of the above

(A) 9. Which is a special data type that enables for a variable to be a set of predefined constants?
(A) enum (B) group (C) set (D) none of the above

(C) 10. Which operator instantiates a class by allocating memory for a new object?
(A) alloc (B) malloc (C) new (D) none of the above

(A) 11. To declare a constant in Java, which modifier should be used? (A) final (B) constant (C) abstract (D) none of the above

(B) 12. Which is the benefit of inheritance? (A) adaptability (B) code reuse (C) efficiency (D) none of the above

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

(D) 14. Which is the code name of Android 4.4? (A) Gingerbread (B) Honeycomb (C) Jelly Bean (D) KitKat

(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

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

(D) 18. Which directory is used to store the resources types for images in Android SDK? (A) R.anim (B) R.drawable (C) R.menu (D) none of the above

(C) 19. Which is a digital distribution platform for Android applications? (A) Android Store (B) Google Store (C) Google Play (D) none of the above

(D) 20. Which class can be used for multiple choices? (A) RadioButton (B) SwitchButton (C) CheckButton (D) CheckBox

Part 2: Questions and Answers (52 points)

1. (a) (3 points) What is an instance method?
(b) (3 points) What is an interface?
(c) (3 points) What is an abstract class?
(d) (3 points) What is the difference between them?

(a) A instance method is a method which must be invoked via an instance of a class.
(b) An interface is an abstract type that is used to specify an interface that classes must implement.
(c) An abstract class is a class at least one of its methods cannot be implemented.
(d) Every method declared in an interface will have to be implemented in the subclass/drived class. Only abstract methods in a abstract class have to be implemented by the subclass.

2. (a) (4 points) Complete the following class for a point with constructors, accessors, and mutators.
```java
class Point {
    private double x, y;
    public Point() { x = y = 0; }
    public Point(double _x, double _y) { x = _x; y = _y; }
    public void setPoint(double _x, double _y) { x = _x; y = _y; }
    public double getX() { return x; }
    public double getY() { return y; }
}
```
(b) (8 points) Create a class for the line equation $ax + by = c$ including the constructors, accessors, and mutators.
(c) (4 points) Write a function for the line equation which returns the area of the triangle formed by the line, x-axis, and y-axis.
(d) (4 points) Write a function for the line equation which passes a point and return the distance from the point to the line.
Hint: $\text{distance}(x_0, y_0, ax + by = c) = \frac{|ax_0 + by_0 - c|}{\sqrt{a^2 + b^2}}$
```java
(a) class Point {
    private double x, y;
    public Point() { x = y = 0; }
    public Point(double _x, double _y) { x = _x; y = _y; }
    public void setPoint(double _x, double _y) { x = _x; y = _y; }
    public double getX() { return x; }
    public double getY() { return y; }
}
(b) (c) (d) class Line {
    private double a, b, c;
    public Line() { a = b = c = 0; }
    public Line(double _a, double _b, double _c) { a = _a; b = _b; c = _c; }
    public void setLine(double _a, double _b, double _c) { a = _a; b = _b; c = _c; }
    public double getA() { return a; }
    public double getB() { return b; }
    public double getC() { return c; }
    public double area() { return 0.5 * c/a * c/b; }
    public double distance(Point p) {
        return Math.sqrt((getA() * p.getX() + getB() * p.getY() - getC()) /
                        (getA() * getA() + getB() * getB()));
    }
}
```

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.