CSE 341 — Java Discussion Questions

1.
```java
class MyPoint {

  public int x, y;

  public MyPoint()
    {this(0,0);}

  public MyPoint(int a)
    {this(a,a);}

  public MyPoint(int x, int y)
    {this.x=x; this.y=y;}

  public void moveTo(int x, int y)
    {this.x = x; this.y = y; }

  public boolean equals (MyPoint p)
    {return (this.x==p.x && this.y==p.y);}

}
```
What is the value of each boolean expression in the following code?

```java
MyPoint p1 = new MyPoint(10);
MyPoint p2 = p1;

p1 == p2;
p1.equals(p2);

p2.moveTo(100,200);
p1 == p2;
p1.equals(p2);

p2 = new MyPoint(10);
p1 == p2;
p1.equals(p2);
```

2. Consider the following Java class definitions. (These compile correctly.)

```java
abstract class Plant {

  // return true if this plant has chlorophyll
  abstract public boolean hasChlorophyll();

  public String description() {
    return "a plant.";
  }
}
```

```
class Tree extends Plant {
  // height of this tree in feet
  private int height;

  public Tree (int height) {
    this.height = height;
  }

  public String description() {
    return "a tree " + height + " feet tall.  also " + super.description();
  }

  public boolean hasChlorophyll() {
    return true;
  }

  static public String hardness() {
    return "unknown";
  }
}

class Oak extends Tree {

  public Oak (int height) {
    super(height);
  }

  public String description() {
    return "an oak.  also "  + super.description();
  }

  static public String hardness() {
    return "very hard";
  }
}



class Cedar extends Tree {

  public Cedar (int height) {
    super(height);
  }

  public String description() {
    return "a cedar.  also "  + super.description();
  }

  static public String hardness() {
    return "soft";
  }
}
```

```
class Mushroom extends Plant {

  public String description() {
    return "a mushroom.  possibly poisonous, so watch out.  also "
      + super.description();
  }

  public boolean hasChlorophyll() {
    return false;
  }

}
```

Now suppose we also have a class `PlantTest` with a `main` method. What is the result of compiling and executing the Java program for each of the following versions of `PlantTest` and `main`? The result might be that the program runs correctly, or it might have a compile time error, or a runtime error. If the program compiles correctly and can be run, give the output. Otherwise explain what the error is.

(a)
```
public class PlantTest {
  public static void main (String [ ] args) {
    Plant p = new Plant();
    System.out.println(p.hasChlorophyll());
    System.out.println(p.description());
  }
}
```

(b)
```
public class PlantTest {
  public static void main (String [ ] args) {
    Plant p = new Mushroom();
    System.out.println(p.hasChlorophyll());
    System.out.println(p.description());
  }
}
```

(c)
```
public class PlantTest {
  public static void main (String [ ] args) {
    Oak o = new Oak(150);
    Tree t = o;
    System.out.println(o.description());
```

```
      System.out.println(t.description());

      System.out.println(o.hardness());
      System.out.println(t.hardness());
    }
  }
```

(d)
```
  public class PlantTest {
    public static void main (String [ ] args) {
      Oak o = new Oak(150);
      Tree t = (Tree) o;
      System.out.println(t.description());
    }
  }
```

(e)
```
  public class PlantTest {
    public static void main (String [ ] args) {
      Tree t = new Oak(150);
      Oak o = (Oak) t;
      System.out.println(o.description());
    }
  }
```

(f)
```
  public class PlantTest {
    public static void main (String [ ] args) {
      Tree t = new Cedar(200);
      Oak o = (Oak) t;
      System.out.println(o.description());
    }
  }
```