1. (2 points) Which methods can access the private variables of a class?
   A. Only static methods of the same class.
   B. Only methods defined in the same class.
   C. Only methods defined in the same package.
   D. Only methods within inner classes.

2. (2 points) A member declared with a protected access modifier is not visible to:
   A. the class in which it is declared.
   B. classes that extend the class in which it is declared.
   C. parent classes of the class in which it is declared.
   D. classes nested inside the class in which it is declared.

3. (5 points) Which of the following are not Java keywords? Select all that apply.
   A. bool
   B. break
   C. enum
   D. import
   E. include
   F. int
   G. switch
   H. if
   I. then
   J. else

4. (2 points) Which code would you use to instantiate a new TreeSet that could only hold Strings?
   A. ... = <String>TreeSet();
   B. ... = new TreeSet<String>();
   C. ... = TreeSet<String>();
   D. ... = new TreeSet<String>();
   E. ... = String<TreeSet>();
   F. ... = new String[TreeSet];
5. Consider the following classes.

```java
public class ClassA {
    public void method1(int i) {
    }
    public void method2(int i) {
    }
    public static void method3(int i) {
    }
    public static void method4(int i) {
    }
}

public class ClassB extends ClassA {
    public void method1(float i) {
    }
    public void method2(int i) {
    }
    public static void method3(int i) {
    }
    public static void method4(float i) {
    }
}
```

(a) (2 points) Which is true of `method1` in the two classes?

A. The method in `ClassB` overrides the method in `ClassA`.
B. The method in `ClassB` overloads the method in `ClassA`.
C. The method in `ClassB` hides the method in `ClassA`.

(b) (2 points) Which is true of `method2` in the two classes?

A. The method in `ClassB` overrides the method in `ClassA`.
B. The method in `ClassB` overloads the method in `ClassA`.
C. The method in `ClassB` hides the method in `ClassA`.

(c) (2 points) Which is true of `method3` in the two classes?

A. The method in `ClassB` overrides the method in `ClassA`.
B. The method in `ClassB` overloads the method in `ClassA`.
C. The method in `ClassB` hides the method in `ClassA`.

(d) (2 points) Which is true of `method4` in the two classes?

A. The method in `ClassB` overrides the method in `ClassA`.
B. The method in `ClassB` overloads the method in `ClassA`.
C. The method in `ClassB` hides the method in `ClassA`.

6. (4 points) Name one method in the `Collections` class, and explain what it does.
7. (4 points) It is possible to declare a `main` method in every single class of a project. What would be the point of doing this?

8. (4 points) What is the keyword `instanceof` used for?

9. (4 points) When reading the API, how can you recognize a generic class?
10. (4 points) Please explain the difference between the “static” and the “non-static” context.

11. (4 points) Why can’t you have a class declared as final abstract?

12. (4 points) What is the difference between a checked and an unchecked exception?
13. (6 points) Please organize the following objects in a feasible inheritance hierarchy: Cat, Dog, Mouse, Mammal, Whale, Wolf, Rodent, Animal, Elephant, Insect, Snake, Reptile, Chicken. Draw a diagram to illustrate. (No code needed.)
14. (12 points) Consider the following classes. What is the output of this code?

```java
class Foo {
    protected int val;
    protected String name;

    public Foo() {
        this("BLAH");
    }

    public Foo(String name) {
        this(name.length(), name);
    }

    private Foo(int val, String name) {
        this.val = val;
        this.name = name;
    }

    public void printStuff(int val) {
        System.out.println(val);
        System.out.println(name);
    }

    public void printStuff(String name) {
        System.out.println(val);
        System.out.println(name);
    }
}

class Bar extends Foo {
    public Bar(String name) {
        System.out.println(name);
    }

    public void printStuff(int val) {
        super.printStuff(val);
        System.out.println(this.val);
    }

    public static void main(String[] args) {
        Foo test = new Bar("MEH");
        test.printStuff(37);
        test.printStuff("BOO");
    }
}
```
15. (12 points) Consider the following class. What is the output of this code?

```java
public class Baz {
    private static int x;
    private int y;

    public Baz(int val) {
        x = val;
        y = val*2;
    }

    public void printStuff() {
        System.out.println(x);
        System.out.println(y);
    }

    public static void main(String[] args) {
        Baz b1 = new Baz(2);
        b1.printStuff();
        Baz b2 = new Baz(3);
        b1.printStuff();
        b2.printStuff();
    }
}
```
16. (8 points) Write a method that takes a `List<String>` and returns the number of characters in all the Strings. In other words, return the sum of the lengths of the Strings in the List.

17. (6 points) Write code to create a JButton with text “Press Me” that prints “Clicky!” to the console when it is pressed. Only create the button, you do not have to add it to a layout, show a window, etc. Use an anonymous class for the action listener.
18. (3 points) Consider the following code.

```java
import java.util.*;
public class Widget {
    private final int value;
    public Widget(int value) {
        this.value = value;
    }
    public static void main(String[] args) {
        Set<Widget> widgets = new HashSet<Widget>();
        for (int i = 0; i < 10; i++) {
            widgets.add(new Widget(i));
        }
        Widget w = new Widget(5);
        System.out.println(widgets.contains(w));
    }
}
```

The output of this code is **false**. Why isn’t my Widget found in the set? What would I need to do to fix this?

19. Why do the following lines of code not compile?
   (a) (2 points) `List<int> numbers;`
   (b) (2 points) `List<String> names = new List<String>();`
   (c) (2 points) `double[] scores = double[50];`