1. What is the Java Virtual Machine (JVM) and what does it do?

The JVM is a program that executes compiled Java (byte codes). It is written in software so that byte codes will run on any platform with a JVM.

2. Which of the following are invalid Java identifiers? Why?

- 2cool //can't start with a number
- tupac4ever
- _foo
- class //can't use keywords
- Class
- bobo the dog //no spaces allowed, bobo
- go-badgers //even for the badgers, no '-' allowed
- object

3. What does it mean to say that Java identifiers are case sensitive?

Case sensitive means that upper- and lowercase versions of the same letter are distinct to the compiler (i.e. Bucky and bucky are two different identifiers).

4. There are two categories of types in Java: primitive and reference. Define each category and give some examples? How are these two categories different? Are String variables of primitive or reference type?

A variable of primitive type contains a single value of a fixed size and format (e.g. a number, character, etc.). int and double are examples of primitive types that hold numbers. Variables of reference type contain an address of the value or values represented by the variable. String variables, like all object variables, are references. One important difference between references and primitives is that you cannot invoke methods on a primitive type.

5. What do the following lines of code output?

- System.out.println(4 * 5 + 6); //26
- System.out.println(4 * (5 + 6)); //44
6. What is overloading? Name two overloaded methods in the String class. (Hint: Use the Java API documentation.)

Method overloading is creating multiple methods in the same class with the same name but different parameters. For example `startsWith()` and `substring()` are both overloaded methods of the String class (there are others).

7. Explain the difference between an object and an object reference.

An object contains state information. An object reference describes the location of an object in memory.

8. Explain the difference between an object and a class.

An object is a collection of values that can be created, stored, and manipulated. A class is a user-defined type that describes a single group of objects with the same potential states and behaviors.

9. What does the variable `duck` contain in the following example?

```
String duck = "quack"; //duck contains a String reference
```

10. Write a Java class whose main method initializes a single String object and uses it to print out your name twice; once in all lowercase and once in all uppercase characters.

```java
public class Foo{
    public static void main(String[] args){
        String dontCallMe = "Bucky B";
        System.out.println("Dont call me " + dontCallMe.toLowerCase());
        System.out.println("I said, don't call me " +
                         dontCallMe.toUpperCase() + ");
    }
}
```

11. Diagram the Edit-Compile-Test cycle. Clearly distinguish between files and the applications that produce or use them. Where do logic errors come in? Syntax errors?

(See page 26 of text.)