Section 1: Multiple choice and short answer (40 marks)

1. Which statement most accurately describes the signature of a method:
   a. The number of parameters.
   b. The number and order of parameters.
   c. The number, order and type of the parameters.
   d. The number, order and type of the parameters, and the return type.
   e. The return type.
   f. None of the above.

2. In the line of code:
   ```java
   if (x <= y) ...
   ```
   The Boolean expression `x <= y` can be replaced by which of the following:
   a. `(x == y) && (x < y)`
   b. `x > y`
   c. `x < y`
   d. `x == y && x < y`
   e. None of the above.

3. How many bits are there in 3 bytes? _________________________

4. How many unique items can be represented by 4 bits? ________________________

5. Which expression will generate a random integer from 1 to 49 inclusive?
   a. `Math.random() * 50 - 1`
   b. `Math.random() * 49 + 1`
   c. `(int)(Math.random() * 49)`
   d. `((int)(Math.random()))*49 + 1`
   e. `(int)((Math.random()*49)+ 1)`

6. List all the primitive data types of the Java programming language:

   ________________________________________________________________________

7. We’ve discussed four different types of commenting in the Java programming language; give a brief example of each:

   ________________________________________________________________________
   ________________________________________________________________________
   ________________________________________________________________________
8. Given the following code:

```java
for (int a = 3; a >= n; a--)
    System.out.print("a");
System.out.print("A");
System.out.println();
```

If n has the value of 1, what would be printed?

a. aAaAaA
b. aaaA

c. aaa
A

d. aaaAAA

e. None of the above.

9. Given the following code:

```java
int a = 5;
while ( (++a) <= 9);{
    System.out.println(a);
}
```

What is the output?

a. 6789
b. 10

c. nothing – there is an infinite loop
d. 56789
e. 5678910
f. None of the above.

10. The code fragment below is intended to add the integers from 1 to 5 inclusive. Which of the following statements (replacing the comment in the code fragment) does NOT do this correctly?

```java
int sum = 0;
for (int k=1; k <= 5; k++) {
    int n = k;
    // STATEMENT GOES HERE
}
```

a. sum = sum + n;
b. sum += n;
c. sum += n++;
d. sum += ++n;
e. sum += n--;
Section 2: Flow graphs (20 marks)

For each code fragment below, construct its corresponding flow graph.

(a)

do {
    if (exp1) {
        S1;
    } else {
        S2;
    } 
    S3;
    while (exp2) {
        S4;
    }
} while (exp3);

(b)

if (exp1) {
    if (exp2) {
        if (exp3) {
            S1;
        }
    } else {
        S2;
    }
} else {
    S3;
}
Given the following flow graph, re-construct the code fragment. Show all work, and list all assumptions.

(c)
Section 3: Pex (20 marks)

Write a program that reads in integer values entered by the user until a value of 0 is entered. After the 0 is entered, the program should print out the number of numbers that were greater than 0 and the number of numbers entered that were less than 0. You do NOT have to error check the input: you may assume that the values entered by users are correctly entered and valid. Use the application framework given.

```java
import cs1.Keyboard;

public class Myclass {
    public static void main (String[] args) {

    } // end main

} // end class
```
Section 4: Pex (20 marks)

Design and implement a class called Clock. It is to have a set of methods that help you keep time. You want to be able to initialize a Clock to a given time in hours, minutes and seconds. Include a method tick(), which advances the clock one second. Use 24-hour time so midnight is hour 0 and noon is hour 12. Include a method toString() which returns the current time converted to a string (i.e. “23:59:30”).