Lab 4 Name:_____ Checked:_____

Objectives:

Learn how to write algorithms and programs using **`while`** loops.

Preparation: Practice tracing loops

- What gets printed? Trace through these loops by hand.

Show output **- OR -** indicate "NO OUTPUT **- OR -** show part of output followed by "INFINITE LOOP."

- Check your answers by running the code and if necessary, make corrections.
- Scan or take a picture of this page and submit through blackboard under "Lab 4 Prep"

```
==================================
int a = 0;
while (a<10)
{
    System.out.println(a);
    a++;
}

==================================
int a = 0;
while (a<10)
    System.out.println(a);
    a++;

// (same as previous,
//     except no braces)

==================================
int a = 0;
while (a<10)
{
    a++;
    System.out.println(a);
}

==================================
int a = 1;
while (a<=10)
{
    System.out.println(a);
    a++;
}

==================================
int a = 10;
while (a<10)
{
    System.out.println(a);
    a++;
}

==================================
```

```
==================================
int a = 10;
while (a>0)
{
    System.out.println(a);
    a--;
}

==================================
int a = 10;
while (a>0)
{
    System.out.println(a);
    a = a - 2;
}

==================================
int a = 1;
while (a <= 10)
{
      if ((a%2)==0)
          System.out.println(a);
      a++;
}

==================================
int a = 1;
while (a <= 5)
{
      System.out.println(2*a);
      a++;
}

==================================
int a = 1;
while (a <= 5)
{
      System.out.println(a);
      a += 2;
}

==================================
```

Repeating Input-Compute-Output Pattern

Let's look at the problem of repeating a calculation, for example, the GPA calculation in one of our earlier programs:
http://www.csc.villanova.edu/~map/1051/f16/examples/GPA.java

We will do this in FOUR ways.
For each of these:

- Write the algorithm
- Implement and test the corresponding Java program

A: Keep getting new inputs and calculating GPAs until user quits program (infinite loop).

Variables:

Algorithm:

Implement this program as **GPA_Infinite.java**

Discuss the algorithm with a classmate and demonstrate your program

Classmate's signature: _____
Classmate's signature means: "I agree this is a reasonable algorithm and that the program works according to the above description."

B: Keep calculating GPAs and ask each time whether to keep going.

Variables:

Algorithm:

Implement this program as **GPA_Ask.java**

Discuss the algorithm with a classmate and demonstrate your program

Classmate's signature: _____

Classmate's signature means: "I agree this is a reasonable algorithm and that the program works according to the above description."

C: Keep calculating GPAs until user inputs -1 for the credits (sentinel value)

Variables:

Algorithm:

Implement this program as **GPA_Sentinel.java**

Discuss the algorithm with a classmate and demonstrate your program

Classmate's signature: _____

Classmate's signature means: "I agree this is a reasonable algorithm and that the program works according to the above description."

D: Calcultate GPA for 3 students (exact count).

Variables:

Algorithm:

***Implement this program as* GPA_ExactCount.java**

Discuss the algorithm with a classmate and demonstrate your program

Classmate's signature: _____

Classmate's signature means: "I agree this is a reasonable algorithm and that the program works according to the above description."

E: Modify one or more of the above algorithms (choose at least one of B, C, or D) and corresponding program to also keep track of and output the maximum GPA computed

Modifying algorithm for: _____B _____C _____ D (check one)

Variables:

Algorithm:

Implement this program as **GPA_Max.java**

Discuss the algorithm with a classmate and demonstrate your program

Classmate's signature: _____

Classmate's signature means: "I agree this is a reasonable algorithm and that the program works according to the above description."

Lab 4 Comments Name:_____ Checked: _____

Comments on this lab, please:

What was the most valuable thing you learned in this lab?

What did you like best about this lab?

Was there any particular problem?

Do you have any suggestions for improving this lab as an effective learning experience?