Variables, Branching Statements, and Loops

1. Write a program where the user enters a number, and the program prints out a right triangle of asterisks (*) where the number is the width of the base and the height. The triangle’s base must be at the top and the point must be at the bottom. Example: If the user enters 5 the program will print out
   *****
   ****
   ***
   **
   *

   import java.util.Scanner;
   public static void main(String[] args)
   {
       Scanner keyboard = new Scanner(System.in);
       System.out.println("Enter the size of the triangle");
       int number = keyboard.nextInt(); //get the base size
       //Put your code here
   }
2. Write a program where the user enters a number, and then the program adds 10 from that number until the it is greater than 50. It must print out the new value at each step.
   Example if the user enters 14 the program will print out
   14
   24
   34
   44

import java.util.Scanner;
public static void main(String[] args) {
    Scanner keyboard = new Scanner(System.in);
    System.out.println("Enter a number");
    int number = keyboard.nextInt(); //get the number
    //Put your code here
}
3. Write a program that prints out each position per 1 second of a particle given an initial starting x and y position, velocities in the x and y direction, and a simulated number of positive, non-zero seconds. The equation for calculating positions are

\[ x = x_0 + v_x \times s_i \]
\[ y = y_0 + v_y \times s_i \]

where \( x \) is the position, \( v_x \) is the given velocity in the x direction, \( x_0 \) is the initial position, and \( s_i \) is the current number of simulated seconds. The previous applies the same for the y position. Make sure that for each simulated second it prints out on a separate line the current second, the current x position, and the current y position in the following format:

“Second: ”<<current simulated second>>“x: ”<<current x>>“y: ”<<current y>>

Values denoted in “<< >>” represent variable values, and strings in quotations denote literal values (make sure to follow capitalization, punctuation, and spacing exactly).

For example, if the user entered \( x_0 = 5 \), \( y_0 = 2 \), \( v_x = 3 \), \( v_y = 2 \), \( s = 10 \), then the output would be:

```
Enter initial x and y positions, then x and y velocities, and finally a simulated number of seconds (strictly greater than 0)
5.0
2.0
3.0
2.0
10.0
Second: 0.0 x: 5.0 y: 2.0
Second: 1.0 x: 8.0 y: 4.0
Second: 2.0 x: 11.0 y: 6.0
Second: 3.0 x: 14.0 y: 8.0
Second: 4.0 x: 17.0 y: 10.0
Second: 5.0 x: 20.0 y: 12.0
Second: 6.0 x: 23.0 y: 14.0
Second: 7.0 x: 26.0 y: 16.0
Second: 8.0 x: 29.0 y: 18.0
Second: 9.0 x: 32.0 y: 20.0
Second: 10.0 x: 35.0 y: 22.0
```
public static void main(String[] args) {

    Scanner keyboard = new Scanner(System.in);
    System.out.println("Enter initial x and y positions, then x and y velocities, and finally a simulated number of seconds (strictly greater than 0) ");
    //Write your solution here
}
Arrays

No sorting algorithms will be on this exam.

1. Write a program that finds the minimum and maximum number in an array and then subtracts the maximum from the minimum and prints the result. The first line printed must be in the format:

   <<maximum>>“-”<<minimum>>“=”<<result>>

   Example if the array given was \{10,4,6,8,2\} the program would print out
   10−2=8

   public static void main(String[] args)
   {
       Scanner keyboard = new Scanner(System.in);
       int[] a = \{10,4,6,8,2\};
       //Put your code here
   }
2. Write a program that multiplies all the number in an array and then prints out the result.
   Example if the array given is \{2,4,6,8\} the program would print 384

   ```java
   public static void main(String[] args) {
       Scanner keyboard = new Scanner(System.in);
       int[] a = \{2,4,6,8\};
       //Put your code here
   }
   ```
3. Write a program that goes through an array and then changes every instance of an even number into a 0, and then prints out the resulting array. Each value should be separated by a space (" ") in the printout.
Example if the array given is \{1,2,3,4,5,6,7,8\} the program will print out
1 0 3 0 5 0 7 0

```java
public static void main(String[] args)
{
    Scanner keyboard = new Scanner(System.in);
    int[] a = {1,2,3,4,5,6,7,8};
    //Put your code here
}
```