CSE110 Midterm Review Lab
(No Submission)

BRANCHING

- **Problem:** Calculate a car's average consumption being provided the total distance traveled (in Km) and the spent fuel total (in liters).

Sample Input	Sample Output
500 35.0	14.286 km/l
Explanation: First input 500 represents the total distance (in Km) and the second one is a floating point number representing the spent fuel (in Litre).	

- **Problem:** Using the following table, write a program that reads a code and the amount of an item. After, print the value to pay. This is a very simple program with the only intention of practicing selection commands.

CODE	Item	Price
1	Hot Dog	$4.00
2	X-Salad	$4.50
3	X-Bacon	$5.00
4	Toast	$2.00
5	Soda	$1.50

Sample Input	Sample Output
3 2	Item: X-Bacon Quantity: 2 Total: $10.00
Explanation: First input is the product code and second input is the quantity of the item. Two X-Bacon were ordered, so the value is $10.00.	

- **Problem:** Read the four integer values corresponding to the x and y axes of two points, p1 (x1, y1) and p2 (x2, y2) and calculate the distance between them. Also, show whether the slope created from this line is positive or negative or zero. The formulas are given below:

$$\text{Distance} = \sqrt{(x2 - x1)^2 + (y2 - y1)^2}$$

$$\text{Slope} = \frac{(y2-y1)}{(x2-x1)}$$

Sample Input	Sample Output
1.0 7.0 5.0 9.0	Distance: 4.4721 Slope: 0.5000 The slope is Positive
Sample Input	**Sample Output**
2.5 -0.4 -12.2 7.0	Distance: 16.4575 Slope: -0.5034 The slope is Negative
Explanation: The first two inputs are x1, y1 and the second two inputs are x2 y2. The result is calculated accordingly.	

- **Problem:** Read 3 floating-point numbers (double) A, B and C and Find the two values of X. If it's impossible to calculate the roots because a division by zero or a square root of a negative number, presents the message “Impossible to calculate”.

$$X = \frac{-B \pm \sqrt{B^2 - 4.A.C}}{2.A}$$

Sample Input	Sample Output
10.0 20.1 5.1	Root#1 = -0.29788 Root#2 = -1.71212
Sample Input	**Sample Output**
0.0 20.0 5.0	Impossible to calculate
Explanation: The three inputs are values of A,B,C respectively. The results are calculated accordingly.	

LOOP

- **Problem:** Write a Java program that will ask the user for the first value, change, and last value of an arithmetic series, and then print the series.

Sample Input	Sample Output
10 20 134	10, 30, 50, 70, 90, 110, 130
Explanation: First value = 10, change = 20, last value = 134. The terms of the series increase by 20, and stop at 130 because 140 would exceed 134. You have to print the commas as well.	
Sample Input	**Sample Output**
0 100 1234	0, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200

- **Problem:** Write Java code of a program that asks the user the value n as input and then prints the value of y. **Hint**: Every 4th term is a negative number.

$$y = 1 + \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} + \frac{1}{6} + \frac{1}{7} - \frac{1}{8} + \ldots\ldots \frac{1}{n}$$

Sample Input	Sample Output
4	Y = 1.5833
Explanation: The result is calculated according to the formula.	

- **Problem:** Write a Java code that asks the user for the value of N as input and then prints the value of Y.

$$y = 3 - 5 + 7 - 9 \ldots\ldots \text{ nth term}$$

Sample Input	Sample Output
5	7
Explanation: If the user gives n=1, print 3. If the user gives n=2, print -2. If the user gives n=3, print 5 and so on. For example, for the input 5 we’ll add up the first 5 numbers of the series, so 3-5+7-9+11 = 7.	

- **Problem:** Write a java program that takes an integer number from the user and prints the value of the pattern given below :

  y = -(1) - (1+2) + (1+2+3) + (1+2+3+4) - (1+2+3+4+5) ….. (1+2+3+4….+n)

Sample Input	**Sample Output**
4	12
Explanation: For the input n = 4 we'll calculate up to the first 4 terms of the series, so -1-3+6+10 = 12	

- **Problem:** Read an integer N that is the number of test cases. Each test case contains two integer numbers X and Y. Print one output line for each test case that is the sum of all odd values between X and Y, not including X and Y.

Sample Input/Output	**Sample Output**
5 4 5 13 10 6 4 3 3 3 8	0 11 5 0 12
Explanation: Here, 5 is N which means there are five test cases. For each test case you have to take two inputs and print the sum of all odd numbers between X and Y (excluding X,Y). You should notice that X could be greater than Y and vice versa.	

- **Problem:** Read an integer N that is the number of test cases that follow. Each test case contains two integers X and Y. Print one output line for each test case that is the sum of Y odd numbers from X including it if is the case. For example:

  for the input 4 5, the output must be 45, that is: 5 + 7 + 9 + 11 + 13
  for the input 7 4, the output must be 40, that is: 7 + 9 + 11 + 13

Sample Input	**Sample Output**
2 4 3 11 2	21 24
Explanation: Here, 2 in N which means there are two test cases. For each test case you have to take two inputs and print the sum of all odd numbers between X and Y (excluding X,Y).	

- **Problem:** Write a java program that takes an integer input from the user and finds the Collatz sequence of that number.
  - Collatz Number:
    - If the current number is even, divide it by 2.
    - If the current number is odd, multiply it by 3 and add 1.
    - Repeat the process until the number becomes 1.

Sample Input	Sample Output	Explanation
4	4,2,1	4/2 -> 2/2 -> 1 (stop)
6	6,3,10,5,16,8,4,2,1	6/2 -> 3*3+1 -> 10/2 -> 5*3+1 -> 16/2 ->8/2 -> 4/2 -> 2/2 -> 1 (stop)

- **Problem:** Write a java program that takes an integer input from the user and calculates the sum of its digits. If the summation is even, please print "The number is even." otherwise print "The number is odd."

Sample Input	Sample Output
54637	The sum is odd.
Explanation: 5+4+6+3+7=25 which is odd.	
2754	The sum is even.
Explanation: 2+7+5+4=18 which is even.	

- **Problem:** Write a java program that takes a binary number as input from the user and prints its decimal equivalent.

Sample Input	Sample Output	Explanation
1111	15	$1(2^3) + 1(2^2) + 1(2^1) + 1(2^0) = 15$
0101	5	$0(2^3) + 1(2^2) + 0(2^1) + 1(2^0) = 5$

- **Problem:** Write a java program that asks the user how many inputs they want to provide and then takes that many inputs and prints the maximum, minimum, and average of all the even positive numbers given by the user. If no even positive number is given, the average should be zero.

Sample Input	**Sample Output**
5 12 -8 19 8 -1	Max: 12 Min: 8 Average: 10
Explanation: At first the user gave 5 as the input which indicates that the user will provide 5 numbers. Then 5 numbers were taken as inputs. Among these, only 12 and 8 are even positive numbers.	

- **Problem:** Write a java program that keeps on taking user inputs until the user provides 0 and prints the maximum, minimum, and average of all the even positive numbers given by the user. If no even positive number is given, the average should be zero.

Sample Input	**Sample Output**
12 -8 19 8 -1 0	Max: 12 Min: 8 Average: 10
Explanation: After giving 5 numbers, the user provided 0, therefore, no more inputs were taken. Among these, only 12 and 8 are even positive numbers.	

Reference:
https://judge.beecrowd.com/en

Tracing

- ➔ What is the value of each of the following arithmetic expressions in Java? Explain your answer:

20/6
10/4.0
8/2-9+5
(8/2-9)+5
Math.pow(36,0.5)
Math.pow(25,1/2)
Math.pow(1,7)-Math.pow(4,1/2.0)
Math.pow(2,4)+Math.pow(3,2)
Math.pow(3,3)+Math.pow(4,2)
5+6-4*2/2+1
5+6-4*(2/2+1)
5 % 3
5.0 / 3
"23" + 3 + 4
4.0+2.0*(5.0+4.0/3.0)
4-(5+4/3)/3.0%2
4%21
-4%21
4%-21
-4%-21
12/5
-12/5
12/-5
-12/-5

- ➔ **Write outputs of following codes:**

```
int p, y = 25, w = 14, j = 12, z = 2, c = 3;
double d = 42;
p = y / 3 % 2;
System.out.println(y - p / 2);
j*=2;
w = w / 2 * 3 - j;
System.out.println(w % 2 + j);
z+= 8;
d/=2;
c = z % c;
d = 1 + d / c + 21;
System.out.println(d / 2 + 3 + "c");
c=c++ + c-- + z++ + z-- + ++c;
System.out.println(c * 2 + d);
```

➔ Show the values of the result variables in the above program:

```
public class T1 {
  public static void main(String[] args) {
    boolean var1=false,var2=false,var3=false,var4=false,var5=false;
    boolean var6=false,result1=false,result2=false,result3=false,result4=false;
    boolean result5=false, result6=false, result7=false, result8=false;
    boolean result9=false, result10=false;
    var1=(!false || false) && true;
    var2=var1 && true;
    var3=false && !true;
    var4=true;
    var5=false;
    var6=var3 && true;
    result1=(var1 && var2) && ( 40 % 3 > 45) || (var5 && var6);
    result2=(var1 || var2) || (result1 && false);
    result3=(var1 && result1) || result2 || var5;
    result4=(var1 || var2) || ((var3 && var1) && false);
    result5=(var1 && var2) && (result3 || var1);
    result6=((var3 || !var2) && (result5)) || true;
    result7=(var4 && result1) && ((result1 && false) || true);
    result8=((var1 && result3) && (!var5 || var6)) && true;
    result9=((result2 && var2) || (!result7 && var1)) && !false;
    result10=!(var1 && true);
  }
}
```

result1	
result2	
result3	
result4	
result5	
result6	
result7	
result8	
result9	
result10	

➔ **Write outputs of following codes:**

```java
public class T2 {
     public static void main(String[] args) {
          int p = 5;
          int q = 6;
          int r = 9;
          int sum = 0;
          if (p < 12) {
                  System.out.println(r + 2);
          } else {
                  System.out.println(r + p);
          }

          if (q > 20){
               System.out.println(r + 19);
          } else if (q <= 6) {
                  System.out.println(q + 3);
          } else{
                  System.out.println(p + q + r);
          }

          if (r > 15) {
                  System.out.println(r);
          } else if (r == 0) {
                  System.out.println(p + q);
          } else {
                  System.out.println(p);
          }

          if (sum != 0) {
                  System.out.println(3);
          } else {
                  System.out.println(sum + 32);
          }

          if(p > 0 && r < 10){
                  System.out.println(p + r);
          } else {
                  System.out.println(p - r);
          }
     }
}
```

➔ **Write outputs of following codes:**

```
public class T3
 {
   public static void main(String args[])
   {
     int x = 0, y =0;
     int sum = 0;
     double p;
     while (x < 10){
       y = x / 2;
       while (y < x){
         p = (x + 10.0) / 2;
         sum = (sum % 2) + x - y * 2 + (int) p ;
         System.out.println(sum);
         y = y + 2;
       }
       if (x > 5){
         x++;
       }else{
         x += 2;
       }
     }
   }
 }
```

➔ **Write outputs of following codes:**

```
public class T4 {
  public static void main(String[] args) {
     int test = 1;
     int j = 0, k = 100;
     while (k > 0) {
         while (j < k ) {
             test = k - j + 21;
             System.out.println(1 + test / 2 + test % 2);
             j+=10;
          }
          k-=10;
      }
   }
}
```

➔ **Write outputs of following codes:**

```
public class T5{
  public static void main(String [] args){
    int x = 4, y = 2, z = 2;
    while ( 50 > z ){
      double sum = 5.5;
      while ( z < 45-y ){
        x = 8 + z * y % (x / 2);
        if (y%2==0){
          z+=3;
          sum = x++;
        }
        else{
          z+=2;
          sum += ++x;
        }
        System.out.println(sum);
        y++;
      }
      break;
    }
  }
}
```

➔ **Write outputs of following codes:**

```
public class T6{
    public static void main(String[] args) {
      int x = 1;
      int y = 3;
      int sum = 0;
      boolean flag = false;
      while (x < 10) {
          if (flag == true) {
                for (int i = 1; i <= 10; i += 2) {
                      sum += i * (++y) ;
                }
                System.out.println(sum);
                flag = false;
          }
          else {
                sum += (x % 3) + (sum/2) + y - 2;
                System.out.println(sum);
                y += 3;
                flag = true;
          }
          x += 1;
      }
      System.out.println(y);
   }
}
```