**Course**: Principals of Software Development – ENSF 409

**Lab 2**

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Exercise A

Triangle.java

public class Triangle {

private int [][] triangle;

private int size;

Triangle(int n) {

//allocate array and fill it

size = n;

triangle = new int [n + 1][];

for (int i = 0; i < n; i++) {

triangle[i] = new int[i + 1];

for (int j = 0; j <= i; j++) {

if (j == 0 || j == i)

triangle[i][j] = 1;

else

triangle[i][j] = triangle[i-1][j-1] + triangle[i-1][j];

}

}

}

public int size() {

return size;

}

public void printTriangle() {

//print triangle to stdout

for (int i = 0; i < size; i++)

for (int j = 0; j <= i; j++)

System.out.printf((j == 0 ? "" : " ") + "%d" + (j == i ? "\n" : ""), triangle[i][j]);

}

public int[] sumRows() {

//array with the sum of each row

int[] sum = new int[size];

for (int i = 0; i < size; i++) {

int rowSum = 0;

for (int j = 0; j <= i; j++)

rowSum += triangle[i][j];

sum[i] = rowSum;

}

return sum;

}

public int[] sumCols() {

//array with the sum of each column

int[] sum = new int[size];

for (int i : sum)

sum[i] = 0;

for (int i = 0; i < size; i++)

for (int j = 0; j <= i; j++)

sum[j] += triangle[i][j];

return sum;

}

public static void main(String[] args) {

if (args.length < 1 ) {

System.err.println("ERROR: No integer argument.");

System.exit(1);

}

for (int i = 0; i < args[0].length(); i++) {

if (!Character.isDigit(args[0].charAt(i))) {

System.err.println("ERROR: Argument is not an integer.");

System.exit(1);

}

}

Triangle pt = new Triangle(Integer.parseInt(args[0]));

pt.printTriangle();

int [] sum\_rows = pt.sumRows();

System.out.println("\nHere are the sum of rows:");

for(int i =0; i < pt.size(); i++)

System.out.println(sum\_rows[i]);

int [] sum\_cols = pt.sumCols();

System.out.println("\nHere are the sum of columns:");

for(int i =0; i < pt.size(); i++)

System.out.printf( "%-5d", sum\_cols[i]);

System.out.println();

}

}

Terminal Output

Mitchell@ttys000 09:10 {0} [2]$ java Triangle 12

1

1 1

1 2 1

1 3 3 1

1 4 6 4 1

1 5 10 10 5 1

1 6 15 20 15 6 1

1 7 21 35 35 21 7 1

1 8 28 56 70 56 28 8 1

1 9 36 84 126 126 84 36 9 1

1 10 45 120 210 252 210 120 45 10 1

1 11 55 165 330 462 462 330 165 55 11 1

Here are the sum of rows:

1

2

4

8

16

32

64

128

256

512

1024

2048

Here are the sum of columns:

12 66 220 495 792 924 792 495 220 66 12 1