LAB 2

ENSF 409 – Principles of Software Development

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Jan 29, 2015

Harry Han
M. Moshipour

Exercise A

Java Code:

```
/**
 * Provides a Pascal's Triangle.
 *
 * The overall purpose is to learn how to use arrays.
 *
 * @author Harry Han
 * @version 1.0
 * @since January 22, 2016
 */
public class Triangle {
	/**
	 * Pascal Triangle
	 */
	private int [][] triangle;
	private int size;

	public Triangle() {
	/**
	 * The default constructor
	 */
	}

	public Triangle (int s) {
	/**
	 * The overloaded constructor.
	 * Generates the Triangle with to the assigned size.
	 */
		size = s;

		triangle = new int [size][];
		for (int i = 0; i < size; i++) {
			triangle[i] = new int [i + 1];
		}

		this.fillTriangle();
	}

	public void fillTriangle() {
	/**
	 * Fills the generated Triangle
	 */
		for (int i = 0; i < size; i++) {
			for (int j = 0; j < i + 1; j++) {
				if (j == 0 || j == i){
					triangle[i][j] = 1;
				}
				else {
					triangle[i][j] = triangle[i-1][j-1] + triangle[i-1][j];
				}
			}
		}
	}
```

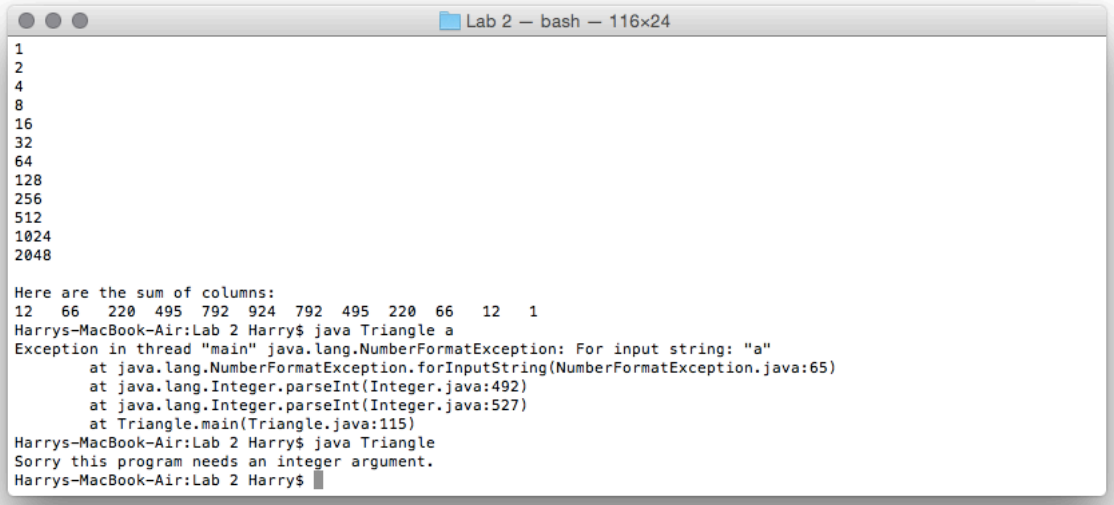
```
	public void printTriangle() {
	/**
	 * Prints the generated triangle
	 */
		for (int i = 0; i < size; i++) {
			for (int j = 0; j < i + 1; j++) {
				System.out.printf("%-5d", triangle[i][j]);
			}
			System.out.println();
		}
	}

	public int[] sumRows() {
	/**
	 * Sums all the rows of the generated triangle
	 */
		int[] arr = new int[size];
		int sum = 0;

		for (int i = 0; i < size; i++) {
			for (int j = 0; j < i + 1; j++) {
				sum+=triangle[i][j];
			}
			arr[i] = sum;
			sum = 0;
		}

		return arr;
	}
```

```
        public int[] sumCols() {
        /**
         * Sums all the columns of the generated triangle
         */
                int[] arr = new int[size];
                int sum = 0;

                for (int i = 0; i < size; i++) {
                        for (int j = 0; j < size - i; j++) {
                                sum+=triangle[j+i][i];
                        }
                        arr[i] = sum;
                        sum = 0;
                }

                return arr;
        }

        public int size() {
        /**
         * Returns the size of the triangle (rows)
         */
                return size;
        }

        public static void main(String[] args) {
                if(args.length < 1 ) {
                        System.err.println("Sorry this program needs an integer argument.");
                        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();
        }
}
```

Output:

```
E:\School\4th Year\ENSF 409\Lab 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
E:\School\4th Year\ENSF 409\Lab 2>
```

```
E:\School\4th Year\ENSF 409\Lab 2>java Triangle 15
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
1    12   66   220  495  792  924  792  495  220  66   12   1
1    13   78   286  715  1287 1716 1716 1287 715  286  78   13   1
1    14   91   364  1001 2002 3003 3432 3003 2002 1001 364  91   14   1

Here are the sum of rows:
1
2
4
8
16
32
64
128
256
512
1024
2048
4096
8192
16384

Here are the sum of columns:
15   105  455  1365 3003 5005 6435 6435 5005 3003 1365 455  105  15   1
E:\School\4th Year\ENSF 409\Lab 2>
```


Lab 2 — bash — 116×24
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
Harrys-MacBook-Air:Lab 2 Harry$ java Triangle a
Exception in thread "main" java.lang.NumberFormatException: For input string: "a"
at java.lang.NumberFormatException.forInputString(NumberFormatException.java:65)
at java.lang.Integer.parseInt(Integer.java:492)
at java.lang.Integer.parseInt(Integer.java:527)
at Triangle.main(Triangle.java:115)
Harrys-MacBook-Air:Lab 2 Harry$ java Triangle
Sorry this program needs an integer argument.
Harrys-MacBook-Air:Lab 2 Harry$