

```
1 /* Recieves two command line integers, n and k, and returns the respective binomial
   coefficient.
2   Uses memoization to optimize the recursive process. */
3 public class Binomial {
4
5     public static void main(String[] args) {
6         System.out.println(binomial(Integer.parseInt(args[0]),
7 Integer.parseInt(args[1])));
8     }
9
10    // Computes and returns the Binomial coefficient
11    public static long binomial(int n, int k) {
12        long[][] memo = new long[n + 1][k + 1];
13
14        if (k > n){
15            return 0;
16        }
17        if (k == 0 || n == 0) {
18            return 1;
19        }
20
21        return (binomial(n - 1, k, memo) + binomial(n - 1, k - 1, memo));
22    }
23
24    public static long binomial(int n, int k, long[][] memo) {
25        if (k > n){
26            return 0;
27        }
28
29        if (k == 0 || n == 0) {
30            return 1;
31        }
32
33        if (memo[n][k] == 0) {
34            memo[n][k] = binomial(n - 1, k, memo) + binomial(n - 1, k - 1, memo);
35        }
36
37        return memo[n][k];
38    }
39 }
```

```
1 /* Features a function that prints the decimal value of a given integer value. */
2 public class IntegerToBinary {
3
4     public static void main(String[] args) {
5         integerToBinary(Integer.parseInt(args[0]));
6         System.out.println("");
7     }
8
9     public static void integerToBinary(int n) {
10        if (n == 0 || n == 1) {
11            System.out.print((int)n);
12        } else {
13            integerToBinary(n / 2);
14            System.out.print(n % 2);
15        }
16    }
17 }
```

```
1 /** Reads a command line string and checks if it's a palindrome. */
2 public class Palindrome {
3
4     public static void main(String[]args) {
5         System.out.println(isPalindrome(args[0]));
6     }
7
8     public static boolean isPalindrome(String s) {
9         int n = s.length();
10        if (n == 0 || n == 1) {
11            return true;
12        } else {
13            if (s.charAt(0) == s.charAt(n - 1)) {
14                return isPalindrome(s.substring(1, n - 1));
15            }
16        }
17
18        return false;
19    }
20 }
```

```

1 /** Prints the Sierpinski Triangle fractal. */
2 public class Sierpinski {
3
4     public static void main(String[] args) {
5         sierpinski(Integer.parseInt(args[0]));
6     }
7
8     // Draws a Sierpinski triangle of depth n on the standard canvass.
9     public static void sierpinski (int n) {
10         double s = Math.sqrt(3) / 2;
11         // first triangle
12         StdDraw.line(0, 0, 0.5, s);
13         StdDraw.line(0.5, s, 1, 0);
14         StdDraw.line(1, 0, 0, 0);
15
16         // n X1 X2 X3 Y1 Y2 Y3
17         sierpinski (n, 0, 1, 0.5, 0, 0, s);
18     }
19
20     public static void sierpinski(int n, double x1, double x2, double x3,
21                                   double y1, double y2, double y3) {
22         // end of drawing rounds
23         if (n == 0) {
24             return;
25         }
26
27         // second triangle
28         // left -> middle
29         StdDraw.line((x1 + x3) / 2, (y1 + y3) / 2, (x2 + x3) / 2, (y2 + y3) / 2);
30         // middle -> right
31         StdDraw.line((x2 + x3) / 2, (y2 + y3) / 2, (x1 + x2) / 2, (y1 + y2) / 2);
32         // right -> left
33         StdDraw.line((x1 + x2) / 2, (y1 + y2) / 2, (x1 + x3) / 2, (y1 + y3) / 2);
34
35         sierpinski(n - 1, x1, (x1 + x2) / 2, (x1 + x3) / 2, y1, (y1 + y2) / 2, (y1 +
36 y3) / 2);
37         sierpinski(n - 1, (x1 + x2) / 2, x2, (x3 + x2) / 2, (y1 + y2) / 2, y2, (y3 +
38 y2) / 2);
39         sierpinski(n - 1, (x1 + x3) / 2, (x3 + x2) / 2, x3, (y1 + y3) / 2, (y3 + y2)
/ 2, y3);
40     }
41 }

```