Exercise 3. *Deadline: 26 October 2009.*

THE JAVA PROGRAMMING LANGUAGE

Pascal's triangle

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Exercise

Pascal's triangle is a geometric arrangement of the *binomial coefficients* in a triangle. It is named after *Blaise Pascal*, a famous French mathematician and philosopher. To build the triangle, start with 1 at the top, then continue placing numbers below it in a triangular pattern. Each number is just the two numbers above it added together (except for the edges, which are all 1).

$$\begin{array}{ccccccccccc} & & & & & 1 & & & & & \\ & & & & 1 & & 1 & & & & \\ & & & 1 & & 2 & & 1 & & & \\ & & 1 & & 3 & & 3 & & 1 & & \\ & 1 & & 4 & & 6 & & 4 & & 1 & \\ 1 & & 5 & & 10 & & 10 & & 5 & & 1 \end{array}$$

This construction is related to the binomial coefficients by Pascal's rule, which states that if

$$(x+y)^n = \sum_{k=0}^{n} \binom{n}{k} x^k y^{n-k}$$

then

$$\binom{n}{0} = \binom{n}{n} = 1$$

$$\binom{n}{k} = \binom{n-1}{k-1} + \binom{n-1}{k}$$

for any nonnegative integer n and any integer k between 1 and $n-1$.

Define a class `Pascal`, which will store the Pascal's triangle of maximum size .

```
public class Pascal
{
    public static final int MAX_SIZE = 10; // perform an experiment (10 is too small)
    private static long[][] pas; // a triangle array for the coefficients
    static
    {
        // the static initialization block
    }

    public static long binomialCoeff (int n, int k) {/*...*/}
};
```

Create a triangle array for Pascal's triangle and fill it with the binomial coefficients inside the static initialization block.

Finally write a program, which will test your `Pascal` class: read integer n from the standard input, and write the binomial expansion $(x+y)^n$ to the standard output.

Example

For $n = 5$ you should print the following result:

```
(x+y)^5 = 1*x^5 + 5*x^4*y + 10*x^3*y^2 + 10*x^2*y^3 + 5*x*y^4 + 1*y^5
```