TP5: Iterations (continued) in Java

Exercise 1 Sierpinski

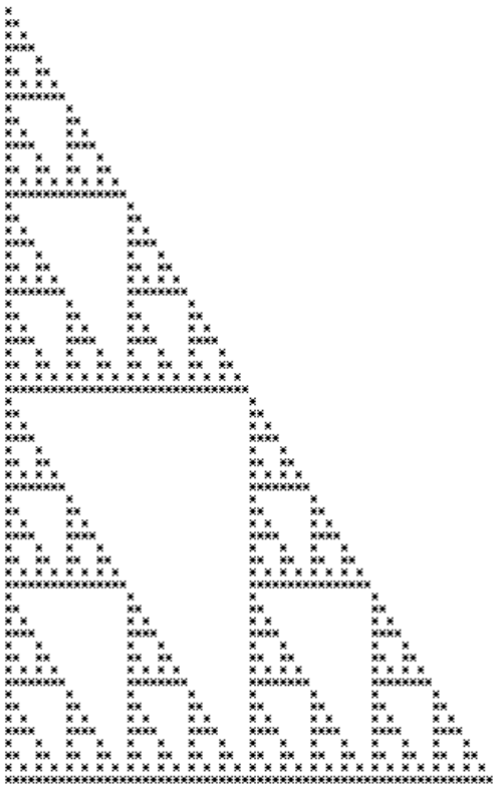
Write a program in java which implements the following algorithm and produces the result in the figure.

Variables

- lig: integer
- i : integer
- j : integer
- dif: integer
- ii : integer
- jj : integer
- max: integer

Algorithm to translate

```
lig ← read
max ← 1
while max < lig do
    max ← max × 2
end while
for i going from lig − 1 to 0 do
    for j going from 0 to max − i − 1 do
        ii ← i
        jj ← j
        div ← max
        while div > 1 and ii + jj < div do
            div ← div/2
            ii ← ii mod div
            jj ← jj mod div
        end while
        if div = 1 then
            write '*'
        else
            write ' '
        end if
    end for
    write '\n'
end for
```



Exercise 2 Multiplication tables

1. Write a program which outputs the multiplication table for an integer on two lines like in the following example for the integer 3:

3	6	9	12	15
18	21	24	27	30

2. Complete the program to output the first 10 multiplication tables.
3. Modify the program to output the tables in the following order:

3	9	15	21	27
6	12	18	24	30

Exercise 3 Pascal Triangle

Write a program which outputs the Pascal triangle with contours around the values like in the image:

```
+----+
|   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|
+----+----+----+----+----+----+----+----+
```

Exercise 4 Fibonacci

Write a program which computes the n-th Fibonacci number defined by: $F_0 = 0$, $F_1 = 1$, $F_n = F_{n-1} + F_{n-2}$ for $n \geq 2$.

Explore the different variants. Do NOT use recursivity!

Exercise 5 Guess the number (continued)

Take the game "guess the number" from the previous TP and reverse the roles. This time the user chooses a number and the computer must find it. For each proposition the user will indicate by $>$, $<$ or $=$ if the number to be found is smaller, larger or equal to the one proposed.

Exercise 6 Matchstick game

The matchstick game is a game for two players. A certain number of matchsticks are available in a pile. The players take turns and at each turn they can take one, two or three matchsticks. The one who takes the last matchstick loses.

Write a program allowing to play this game. The program should allow for each of the two players to decide if a human plays or the computer plays.