Exercise 1.12. The following pattern of numbers is called *Pascal's triangle*.

```
            1
         1     1
      1     2     1
   1     3     3     1
1     4     6     4     1
```

The numbers at the edge of the triangle are all 1, and each number inside the triangle is the sum of the two numbers above it.[1] Write a procedure that computes elements of Pascal's triangle by means of a recursive process.

Answer.

```
(define (pascal-triangle row column)
  (cond ((or (< cloumn 1) (< row column)) 0)
        ((or (= column 1) (= row column)) 1)
        (else (+ (pascal-triangle (- row 1) (- column 1))
                 (pascal-triangle (- row 1) column)))))
```

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1. The elements of Pascal's triangle are called the *binomial coefficients*, because the nth row consists of the coefficients of the terms in the expansion of $(x + y)^n$. This pattern for computing the coefficients appeared in Blaise Pascal's 1653 seminal work on probability theory, *Traité du triangle arithmétique*. According to Knuth (1973), the same pattern appears in the *Szu-yuen Yü-chien*("The Precious Mirror of the Four Elements"), published by the Chinese mathematician Chu Shih-chieh in 1303, in the works of the twelfth-century Persian poet and mathematician Omar Khayyam, and in the works of the twelfth-century Hindu mathematician Bháscara Áchárya.