

```

exp(2.000000) = 7.389046
The number of terms used is: 12
>> expox
Enter x -4
exp(-4.000000) = 0.018307
The number of terms used is: 18
>> expox
Enter x 21
More than 30 terms are needed

```

12 terms used.

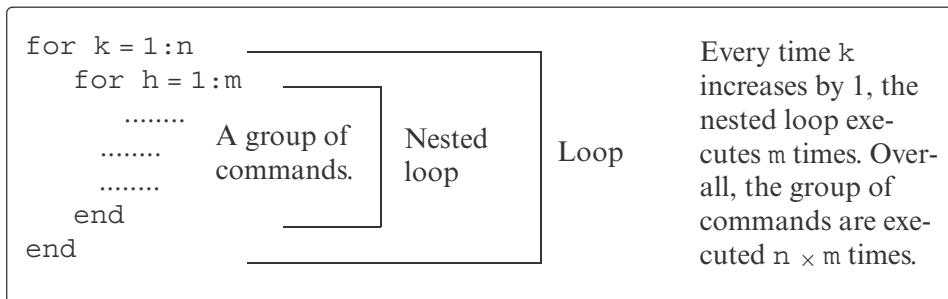
Calculating exp(-4).

18 terms used.

Trying to calculate exp(21).

### 6.5 NESTED LOOPS AND NESTED CONDITIONAL STATEMENTS

Loops and conditional statements can be nested within other loops or conditional statements. This means that a loop and/or a conditional statement can start (and end) within another loop or conditional statement. There is no limit to the number of loops and conditional statements that can be nested. It must be remembered, however, that each `if`, `case`, `for`, and `while` statement must have a corresponding `end` statement. Figure 6-7 shows the structure of a nested



**Figure 6-7: Structure of nested loops.**

`for-end` loop within another `for-end` loop. In the loops shown in this figure, if, for example,  $n = 3$  and  $m = 4$ , then first  $k = 1$  and the nested loop executes four times with  $h = 1, 2, 3, 4$ . Next  $k = 2$  and the nested loop executes again four times with  $h = 1, 2, 3, 4$ . Finally  $k = 3$  and the nested loop executes again four times. Every time a nested loop is typed, MATLAB automatically indents the new loop relative to the outside loop. Nested loops and conditional statements are demonstrated in the following sample problem.

### Sample Problem 6-8: Creating a matrix with a loop

Write a program in a script file that creates an  $n \times m$  matrix with elements that have the following values. The value of each element in the first row is the number of the column. The value of each element in the first column is the number of the row. The rest of the elements each has a value equal to the sum of the element above it and the element to the left. When executed, the program asks the user to enter values for  $n$  and  $m$ .

#### Solution

The program, shown below, has two loops (one nested) and a nested if-elseif-else-end structure. The elements in the matrix are assigned values row by row. The loop index variable of the first loop,  $k$ , is the address of the row, and the loop index variable of the second loop,  $h$ , is the address of the column.

```
n=input('Enter the number of rows ');
m=input('Enter the number of columns ');
A=[];
for k=1:n
    for h=1:m
        if k==1
            A(k,h)=h;
        elseif h==1
            A(k,h)=k;
        else
            A(k,h)=A(k,h-1)+A(k-1,h);
        end
    end
end
A
```

Define an empty matrix A.

Start of the first for-end loop.

Start of the second for-end loop.

Start of the conditional statement.

Assign values to the elements of the first row.

Assign values to the elements of the first column.

Assign values to other elements.

end of the if statement.

end of the nested for-end loop.

end of the first for-end loop.

The program is executed in the Command Window to create a  $4 \times 5$  matrix.

```
>> Chap6_exp8
Enter the number of rows 4
Enter the number of columns 5
```