

### 7.1.1 Counters

The work with loops sometimes requires the use of counters. The general structure of a counter statement is as follows:

$$\text{count} = \text{count} + 1$$

the value of the variable (count) is updated or increased by one each time the program reads the counter statement. The value of (count) must be initialized to zero before starting the loop containing the counter. Counters are used with loops to count the number of entries to a certain block of statements.

**Ex. 7.7** Write Matlab program to sort the following numbers into two groups: the first group contains numbers greater than 100 and the second group contains numbers less than or equal 100. Evaluate and print the number of elements in each group and find their average. Use loops and counters.

$x = [100 \ 150 \ 120 \ 90 \ 70 \ 110 \ 85 \ 250 \ 300 \ 50]$

**Sol.**

```
clear,clc
a=0;r=0;b=0;s=0;
for x=[100 150 120 190 70 110 85 250 300 50]
    if x>100
        a=a+1;
        x1(a)=x;
        r=r+x1(a);
    elseif x<=100
        b=b+1;
        x2(b)=x;
        s=s+x2(b);
    end
end
avg1=r/a ; avg2=s/b ;
disp(x1)
fprintf(' There are %2.0f numbers greater than 100\n',a)
fprintf(' Their average is %5.3f \n',avg1)
disp(' ')
disp(x2)
fprintf(' There are %2.0f numbers less than or equal
                                             100\n',b)
fprintf(' Their average is %5.3f \n',avg2)
```

**Run:**

150    120    190    110    250    300

There are 6 numbers greater than 100

Their average is 186.667

100    70    85    50

There are 4 numbers less than or equal 100

Their average is 76.250

### **7.1.2 Nesting loops**

When a loop is placed inside another loop the result is a nesting loop. A third loop can be placed inside the previous outside loops and so forth. In nesting loops the most inner loop runs first for each turn of the loop directly comprising it. therefore if and outside loop has 5 turns and the inside loop has 10 turns then the result is that the block inside the inner loop will run 50 times.

**Ex. 7.8** Repeat the program of Ex. 7.4 using a two dimensional matrix of 3 rows and 4 columns.

**Sol.** *The sorting of a two dimensional matrix should always be done by nesting loops.*

<pre>clear,clc x=[ 5  -3  4  7 ; -2  8  6  -9 ; 1  5  -5  -7 ]; disp(x) [r,c]=size(x); for i=1:r     for j=1:c         if x(i,j)&lt;0             x(i,j)=0;         end     end end disp(x)</pre>	<p><b><u>Run:</u></b></p> <table border="0"><tr><td>5</td><td>-3</td><td>4</td><td>7</td></tr><tr><td>-2</td><td>8</td><td>6</td><td>-9</td></tr><tr><td>1</td><td>5</td><td>-5</td><td>-7</td></tr><tr><td colspan="4"> </td></tr><tr><td>5</td><td>0</td><td>4</td><td>7</td></tr><tr><td>0</td><td>8</td><td>6</td><td>0</td></tr><tr><td>1</td><td>5</td><td>0</td><td>0</td></tr></table>	5	-3	4	7	-2	8	6	-9	1	5	-5	-7					5	0	4	7	0	8	6	0	1	5	0	0
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