Chapter Six

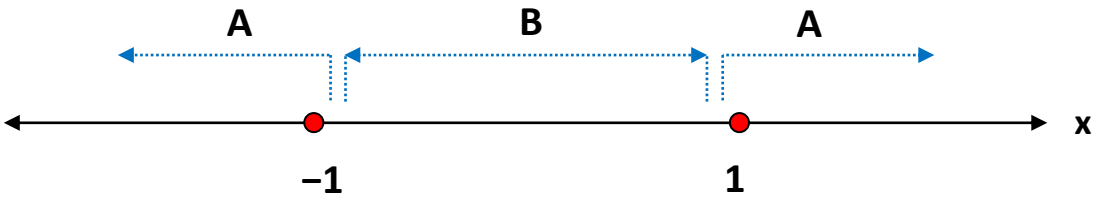
Conditional Statements

Conditional commands are related to making decision depending on certain conditions. Conditions in Matlab can be either simple or compound.

Simple conditions: they are related to comparisons between two numbers or values, e.g. x and y:

x is greater than y	x > y
x is less than y	x < y
x is equal to y	x = y (in Matlab it is written x == y)
x is not equal to y	x ≠ y (in Matlab it is written x ~= y)
x is greater than or equal y	x >= y
x is less than or equal y	x <= y

Compound conditions: they are performed by combining two or more simple conditions using the words (and , in Matlab &) (or , in Matlab |)



Group A : x <= −1 | x >= 1

Group B : x > −1 & x < 1

The command (find) : this command is used to identify the locations of numbers that comply certain condition/s:

locations of matrix x elements that comply conditions = find(conditions on matrix x)

Ex. Write Matlab program to select the numbers that have values greater than -1 and less than 1 from a group of arbitrary numbers. Print also the rest of numbers

Sol.

```
clear,clc
x = [-4,4,-1,1,0,0.5,-0.5,10,-1.5,0.7,-0.6,0.3];
b = find(x>-1 & x<1);    % locations of elements
disp(x)
B=x(b);                  % values of the elements
disp([b',B'])
disp(' ')
a = find(x<=-1 | x>=1);
A = x(a);
disp([a',A'])
```

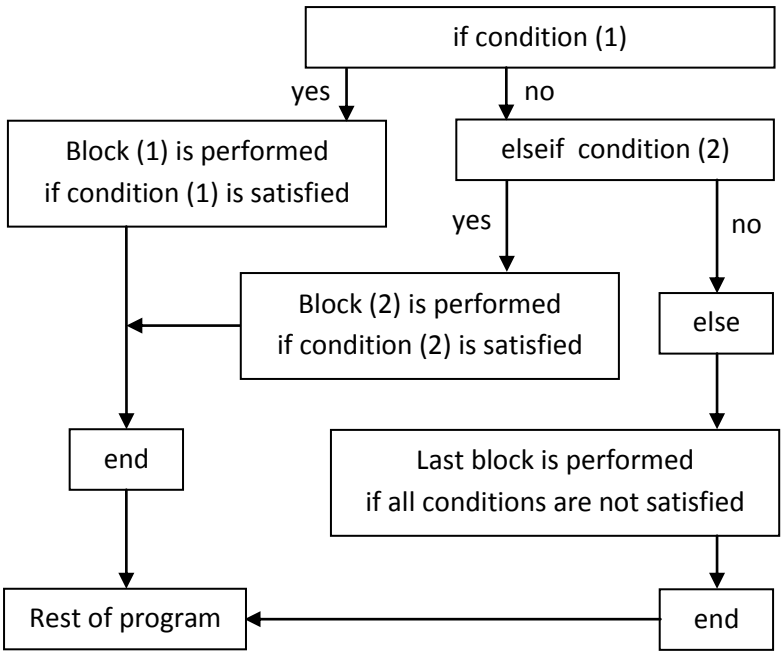
Ex. Write Matlab program to print a table of three columns where the first column represents the numbers from 1 to 10 (10 students), the second column is the age of each student and the third column is the height of each student. The program should then sort the students according to age (18 – 25 years) and height (taller than 175 cm).

Student No.	Age	Height
1	16	170
2	17	180
3	20	178
4	23	170
5	24	182
6	30	178
7	25	166
8	18	180
9	35	162
10	17	180

```
clear,clc
NO = 1:10;
AGE = [16 17 20 23 24 30 25 18 35 17];
HEIGHT=[170 180 178 170 182 178 166 180 162 180];
TABLE=[NO' AGE' HEIGHT'];
disp(TABLE)
a=find(AGE>=18 & AGE <=25);
TABLE_AGE=[a' AGE(a)' HEIGHT(a)'];
disp(TABLE_AGE)
b=find(AGE>=18 & AGE <=25 & HEIGHT>=175);
TABLE_AGE_HEIGHT=[b' AGE(b)' HEIGHT(b)'];
disp(TABLE_AGE_HEIGHT)
```

The command (if)

This command is used to direct the flow of the program according to a specific simple or compound condition. The program is directed to perform a block of statements when the condition/s is valid or other blocks otherwise. The structure of (if) statement is as follows:



Note: The command (if) cannot be used with matrices of more than one element because the condition must be satisfied for all elements.

Ex. Write Matlab program to test the sign of a number whether it is positive, negative or zero and print a suitable statement to indicate that.

Sol.

```
clear , clc
x = input( ' Enter a number = ') ;
if x > 0
    disp(' The number is positive')
elseif x < 0
    disp(' The number is negative')
else
    disp(' The number is zero')
end
```

Ex. Write Matlab code to evaluate the following function for any value of x:

$$y = \begin{cases} \dfrac{x+1}{x-1} & x > 1 \\ x^2 + x - 1 & -1 \le x \le 1 \\ ln(x^2) & x < -1 \end{cases}$$

Sol.

```
clear,clc
x=input(' x = ');
if x>1
    y=(x+1)/(x-1);
elseif x>=-1 && x<=1
    y=x^2+x-1;
else
    y=log(x^2);
end
disp([x,y])
```

Ex. Write Matlab program to enter the following two dimensional matrix. Make the program extract the elements that are greater than or equal 10 and less than or

equal 20. Print the sorted elements indicating the row and column number of each one of them. If half of the elements satisfy the condition then print the phrase: "Half of the numbers are within the range".

15	7	12	25
20	19	18	8
5	14	3	10

Sol.

```
clear,clc
x=[15 7 12 25 ; 20 19 18 8 ;...
    5 14 3 10];
disp(x)
a=find(x>=10 & x<=20);
[b,c]=find(x>=10 & x<=20);
R=[x(a), b , c]';
fprintf('the number %2.0f is in row %1.0f and column %1.0f\n',R)
if length(a)>=length(x(:))/2
    disp(' ')
    disp('the number of elements that comply the condition is:')
    disp(length(a))
    disp('Half or more of the numbers are within the range')
end
```