`max(x)`	Returns largest value in vector `x`, or the row vector of largest elements of each column in matrix `x`
`[y,k] = max(x)`	Returns maximum values `y` and corresponding indices `k` of the first maximum value from each column of `x`.
`max(x,y)`	Returns a matrix the same size as `x` and `y`, with each element being the maximum value from the corresponding positions in `x` and `y`.
`min(x)`	Returns smallest value in vector `x`, or the row vector of smallest elements of each column in matrix `x`
`[y,k] = min(x)`	Returns minimum values `y` and corresponding indices `k` of first minimum value from each column of `x`.
`min(x,y)`	Returns a matrix the same size as `x` and `y`, with each element being the minimum value from the corresponding positions in `x` and `y`.

Determining the maximum and minimum of a vector:

```
>> v = [3 -2 4 -1 5 0];
>> max(v)
ans =
     5
>> [vmin, kmin] = min(v)

        -2
    kmin =
         2
```

The maximum value is found to be 5, the minimum value -2, and the index of the minimum value is 2. Thus, `vmin = v(kmin) = v(2) = -2`.

`%X = rand(sz1,...,szN)` returns an `sz1`-by-...-by-`szN` array of random numbers where `sz1,...,szN` indicate the size of each dimension. For example, `rand(3,4)` returns a 3-by-4 matrix.

To generate a random number between [a,b]:

```
r = a + (b-a)*rand();
```

To generate N numbers:

```
r = a + (b-a)*rand(1,N);
```

```
data1=10+40*rand(1,5)
data2=1+4*rand(1,10)+3
```

For the random data vectors `data1` and `data2`:

```
>> max(data1)
ans =
    3.9985
>> min(data1)
ans =
    2.0005
>> [max2,kmax2] = max(data2)
max2 =
    5.7316
kmax2 =
   256
>> [min2,kmin2] = min(data2)
min2 =
    0.3558
kmin2 =
   268
```

For a matrix, the `min` and `max` functions return a row vector of the minimum or maximum elements of each column of the matrix.

```
>> B = [-1 1 7 0; -3 5 5 8; 1 4 4 -8]
B =
    -1     1     7     0
    -3     5     5     8
     1     4     4    -8
>> min(B)
ans =
    -3     1     4    -8
>> max(B)
ans =
     1     5     7     8
```

Example 7.2 *Summation*

The following is a summation identity

$$\sum_{n=1}^{N} n = \frac{N(N+1)}{2}$$

This identity can be checked with MATLAB, for example, for $N = 8$:

```
>> N = 8;
>> n =1:8;
>> S = sum(n)
S =
    36
>> N*(N+1)/2
ans =
    36
```

Example 7.3 *Factorial*

The **factorial** of n is expressed and defined as

$$n! = n \cdot (n-1) \cdot (n-2) \cdots 1$$

This can be computed as `prod(1:n)`, as in the following examples:

```
>> nfact = prod(1:4)
nfact =
    24
>> nfact = prod(1:70)
nfact =
  1.1979e+100
```

Q1. If two sides of a right triangle have lengths 31 and 45, what is the length of the hypotenuse?

Q2. Generate a random data set with 20 elements, values between 5 and 40 and calculate its minimum and maximum value of that data set.

Q3. Solve $\frac{7!}{2!*3!}$.

Q4. Calculate $\sum n^2$ for n=15.

[Formula for $\sum n^2$= n(n+1)(2n+1)/6].

Q5. Find the sum of odd numbers between 100 and 200.

Q6. Create a vector t with 10 elements: 1 , 2, 3, . . . , 10. Now compute the following quantities:

- $x = t\ \sin(t)$.
- $y = \frac{t-1}{t+1}$.
- $z = \frac{\sin(t^2)}{t^2}$.