

- **The main diagonal** of a square matrix is the set of terms a_{ii} for which the row and column indices are the same.
- the set of numbers is **1, 6, 11** is called the diagonal

1	2	3
5	6	7
9	10	11

- A square matrix is an **identity matrix**, called [I],
- if $A_{ij} = 1$ for $i = j$ and $A_{ij} = 0$ for $i \neq j$.
- all of the numbers on the diagonal are 1 and all others are 0.

Following is a 3 x 3 **identity matrix**:

- `[r c] = size(A);` if $r = c$ (for square matrix)

1	0	0
0	1	0
0	0	1

Ex : to sum main diagonal of matrix A

```

1 -   clc,clear
2 -   a=[1 2 3;4 5 6; 7 8 9]
3 -   [r c] = size(a);
4 -   if r ~= c
5 -       outsum = [];
6 -   else
7 -       outsum = 0;
8 -       for i = 1:r
9 -           outsum = outsum + a(i,i);
10 -        end
11 -   end
12 -   outsum
    
```

```

a =

     1     2     3
     4     5     6
     7     8     9

outsum =

    15
    
```

- If the result of multiplying a matrix **A** by another matrix is the identity matrix **I**, then the second matrix is the inverse of matrix A. **The inverse of a matrix A is written as A^{-1} .**

- $[A][A^{-1}] = [I]$

- Both matrices A and A^{-1} must be square.

EX

$$A * A^{-1} = A^{-1} * A = I$$

$$\begin{bmatrix} 2 & 1 & 4 \\ 4 & 1 & 8 \\ 2 & -1 & 3 \end{bmatrix} \begin{bmatrix} 5.5 & -3.5 & 2 \\ 2 & -1 & 0 \\ -3 & 2 & 1 \end{bmatrix} = \begin{bmatrix} 5.5 & -3.5 & 2 \\ 2 & -1 & 0 \\ -3 & 2 & 1 \end{bmatrix} \begin{bmatrix} 2 & 1 & 4 \\ 4 & 1 & 8 \\ 2 & -1 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

- In MATLAB the inverse of a matrix can be obtained either by raising **A to the power of -1**, or with the **inv(A)** function.

- `>> A=[2 1 4; 4 1 8; 2 -1 3]`

- `B=inv(A)`

`A*B`

`>> ans = 1 0 0`

`0 1 0`

`0 0 1`

- Or `>> A*A^-1`

`ans = 1 0 0`

`0 1 0`

`0 0 1`