Use sympy for basic operations in python

Q.1)Using python code construct the following matrices a)An identity of 9 *9 b)Zero matric of order 7*5 c)Ones matrix of order 6*4

In [3]:
```
from sympy import*
```

In [4]:
```
#1
eye(9)
```

Out[4]:
$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

In [6]:
```
#2
zeros(7,5)
```

Out[6]:
$$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

In [7]:
```
#3
ones(6,4)
```

Out[7]:
$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$$

Q.2) Using a python program find the determinants, inverts and also transpose of the given matrices

In [8]:
```
A=Matrix([[1,0,7],[2,1,6],[3,4,0]])
A
```

Out[8]:
$$\begin{bmatrix} 1 & 0 & 7 \\ 2 & 1 & 6 \\ 3 & 4 & 0 \end{bmatrix}$$

In [10]:
```
B=Matrix([[2,5],[-1,4]])
B
```

Out[10]:
$$\begin{bmatrix} 2 & 5 \\ -1 & 4 \end{bmatrix}$$

In [11]:
```
#determinant
print(A.det())
print(B.det())
```

```
11
13
```

In [12]:
```
#inverse
(A.inv())
```

Out[12]:
$$\begin{bmatrix} -\frac{24}{11} & \frac{28}{11} & -\frac{7}{11} \\ \frac{18}{11} & -\frac{21}{11} & \frac{8}{11} \\ \frac{5}{11} & -\frac{4}{11} & \frac{1}{11} \end{bmatrix}$$

In [13]:
```
#transpose
A.T
```

Out[13]:
$$\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 4 \\ 7 & 6 & 0 \end{bmatrix}$$

Q.3)Using sympy module find the following operation for the matrices.

In [14]:
```
A=Matrix([[4,1,0],[7,5,2],[1,-6,2]])
A
```

Out[14]:
$$\begin{bmatrix} 4 & 1 & 0 \\ 7 & 5 & 2 \\ 1 & -6 & 2 \end{bmatrix}$$

In [15]:
```
B=Matrix([[8,0,3],[2,4,1],[4,0,-1]])
B
```

Out[15]:
$$\begin{bmatrix} 8 & 0 & 3 \\ 2 & 4 & 1 \\ 4 & 0 & -1 \end{bmatrix}$$

In [16]:
```
#1
2*A+B
```

Out[16]:
$$\begin{bmatrix} 16 & 2 & 3 \\ 16 & 14 & 5 \\ 6 & -12 & 3 \end{bmatrix}$$

In [18]:
```
#2
3*A-5*B
```

Out[18]:
$$\begin{bmatrix} -28 & 3 & -15 \\ 11 & -5 & 1 \\ -17 & -18 & 11 \end{bmatrix}$$

In [19]:
```
#3
B**-1
```

Out[19]:
$$\begin{bmatrix} \frac{1}{20} & 0 & \frac{3}{20} \\ -\frac{3}{40} & \frac{1}{4} & \frac{1}{40} \\ \frac{1}{5} & 0 & -\frac{2}{5} \end{bmatrix}$$

In [20]:
```
#4
A**3
```

Out[20]:
$$\begin{bmatrix} 157 & 56 & 22 \\ 414 & 81 & 68 \\ -439 & -193 & -98 \end{bmatrix}$$

In [21]:
```
#5
A.T+B.T
```

Out[21]:
$$\begin{bmatrix} 12 & 9 & 5 \\ 1 & 9 & -6 \\ 3 & 3 & 1 \end{bmatrix}$$

Q.4)using python syntax verify that (AB)^t = B^t*A^t Where

In [22]:
```
A=Matrix([[3,-1],[6,4]])
A
```

Out[22]:
$$\begin{bmatrix} 3 & -1 \\ 6 & 4 \end{bmatrix}$$

In [24]:
```
B=Matrix([[4,0],[-1,7]])
B
```

Out[24]:
$$\begin{bmatrix} 4 & 0 \\ -1 & 7 \end{bmatrix}$$

In [28]:
```
if (B.T)*(A.T)==(A*B).T:
    print("verified")
else:
    print("Not verified")
```

verified

In [ ]: