In [1]:
```
from sympy import *
```

In [16]:
```
A = Matrix([[2,2,-1],[2,-1,2],[-1,2,2]])/3
A
```

Out[16]:

$$\begin{bmatrix} \frac{2}{3} & \frac{2}{3} & -\frac{1}{3} \\ \frac{2}{3} & -\frac{1}{3} & \frac{2}{3} \\ -\frac{1}{3} & \frac{2}{3} & \frac{2}{3} \end{bmatrix}$$

In [17]:
```
A.transpose()*A
```

Out[17]:

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

In [4]:
```
# Hva slags isometri representerer A?
```

In [18]:
```
det(A)
```

Out[18]: -1

In [19]:
```
A*A
```

Out[19]:

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

In [8]:
```
# A representerer altså en speiling i et plan gjennom origo.
```

In [20]:
```
A.eigenvects()
```

Out[20]:
```
[(-1, 1, [Matrix([
   [ 1],
   [-2],
   [ 1]])]), (1, 2, [Matrix([
   [2],
   [1],
   [0]]), Matrix([
   [-1],
   [ 0],
   [ 1]])])]
```

In [10]:
```
v = Matrix([1,-2,1])
v
```

Out[10]:

$$\begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix}$$

In [21]:
```
A*v + v
```

Out[21]:

$$\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

In [14]:
```
Q = eye(3) - 2*v*v.transpose()/v.norm()**2
```

In [22]:
```
Q - A
```

Out[22]:

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

In [ ]:
```
# A er altså lik Householder-transformasjonen til v.
```