In [1]:
```
import numpy as np
from scipy.linalg import svd
```

In [2]:
```
#define a matrix
c=np.array([[-1,2,0],[2,0,-2],[0,-2,1]])
```

In [3]:
```
#singular value decomposition
U,S,VT=svd(c)
```

In [4]:
```
U
```

Out[4]:
```
array([[-0.59628479, -0.4472136 , -0.66666667],
       [-0.2981424 ,  0.89442719, -0.33333333],
       [ 0.74535599,  0.        , -0.66666667]])
```

In [5]:
```
S
```

Out[5]:
```
array([ 3.,  3., -0.])
```

In [6]:
```
VT
```

Out[6]:
```
array([[ 0.        , -0.89442719,  0.4472136 ],
       [ 0.74535599, -0.2981424 , -0.59628479],
       [ 0.66666667,  0.33333333,  0.66666667]])
```

In [7]:
```
# populate Sigma with n x n diagonal matrix
sigma=np.diag(S)
# reconstruct
b=U.dot(sigma.dot(VT))
b
```

Out[7]:
```
array([[-1.00000000e+00,  2.00000000e+00, -3.33066907e-16],
       [ 2.00000000e+00,  1.11022302e-16, -2.00000000e+00],
       [ 0.00000000e+00, -2.00000000e+00,  1.00000000e+00]])
```

In [8]:
```
# select
n_elements=2
sigma=sigma[:, :n_elements]
VT=VT[:n_elements, :]
```

In [12]:
```
# transform
T=U.dot(sigma)
T=c.dot(VT.T)
T
```

Out[12]:
```
array([[-1.78885438e+00, -1.34164079e+00],
       [-8.94427191e-01,  2.68328157e+00],
       [ 2.23606798e+00,  2.22044605e-16]])
```

In [ ]:
```

```