2

In [1]:
```
import numpy as np
import numpy.linalg as la
import matplotlib.pyplot as pt
```

In [2]:
```
u = [[1,0,0,0],[0,0,0,1],[0,0,1,0],[0,1,0,0]]
u_1 = [[1,0],[0,0],[0,0],[0,1]]
```

In [3]:
```
s = [[4,0,0,0],[0,3,0,0],[0,0,2,0],[0,0,0,1]]
s_1 = [[4,0],[0,3]]
```

In [4]:
```
v = [[1,0,0,0,0],[0,1,0,0,0],[0,0,1,0,0],[0,0,0,1,0]]
v_1 = [[1,0,0,0,0],[0,1,0,0,0]]
```

In [5]:
```
#t = np.dot(u_1,s_1)
M = np.dot(np.dot(u_1,s_1), v_1)
M
```

Out[5]:
```
array([[4, 0, 0, 0, 0],
       [0, 0, 0, 0, 0],
       [0, 0, 0, 0, 0],
       [0, 3, 0, 0, 0]])
```

3(a)

In [6]:
```
X = [[1,2,3],[4,5,6]]
```

In [7]:
```
U, sigma, VT = la.svd(X, full_matrices=0)
```

In [8]:
```
U[0]
```

Out[8]:
```
array([-0.3863177 , -0.92236578])
```

In [9]:
```
sigma[0]
```

Out[9]:
```
9.508032000695723
```

In [10]:
```
VT
```

Out[10]:
```
array([[-0.42866713, -0.56630692, -0.7039467 ],
       [ 0.80596391,  0.11238241, -0.58119908]])
```

In [11]:
```
U_1 = U[0]
U_1 = U_1.reshape(2,1)
```

In [12]:
```
sigma_1 = sigma[0]
sigma_1 = sigma_1.reshape(1,1)
```

In [13]:
```
VT_1 = VT[0,:]
VT_1 = VT_1.reshape(1,3)
```

In [14]:
```
temp = np.dot(U_1,sigma_1)
temp = temp.reshape(2,1)
```

In [15]:
```
M_ = np.dot(temp, VT_1)
M_
```

Out[15]:
```
array([[1.57454629, 2.08011388, 2.58568148],
       [3.75936076, 4.96644562, 6.17353048]])
```

In [ ]:
```

```