2012-11598 민두기

1.

eigenvalue = 0, 0.8377, 7.1623

corresponding eigenvector = [-0.4082, 0.8164, -0.4082], [-0.8863, -0.2475, 0.3913], [0.2185, 0.5216, 0.8247]

2-(a).

M^T * M =

36	37	38
37	49	61
38	61	84

M * M^T =

14	26	22	16	22
26	50	46	28	40
22	46	50	20	32
16	28	20	20	26
22	40	32	26	35

2-(b), (c)

eigenvalue of M^T * M = 0, 15.4330, 153.5670

corresponding eigenvector = [-0.4082, 0.8164, -0.4082], [-0.8160, -0.1259, 0.5642], [0.4093, 0.5635, 0.7176]

eigenvalue of M * M^T = 0, 0, 0, 15.4330, 153.5670

corresponding eigenvector =

[0.819083117570684,
-0.513337242448826,
0.122896317849225,
-0.197871799165985,
0.106447020529668]

[-0.413250313398046,
-0.639057855441842,
0.397057464215007,
0.379546257878910,
0.345136558648537]

[-0.210720132769024,
0.0388285260098380,
-0.120762731511627,
-0.672483774673870,
0.698048212297649]

[0.159063930284883,
-0.0332003042935725,

-0.735856634020250,
0.510392095148222,
0.414259977858995]

[0.297695678025794,
0.570508561088987,
0.520742971163787,
0.322578472988394,
0.458984914519991]

2-(d).

M = U * sigma * V^T
U =

0.2977	0.1591
0.5705	-0.0332
0.5207	-0.7359
0.3226	0.5104
0.4590	0.4143

V =

0.4093	-0.8160
0.5635	-0.1259
0.7176	0.5642

Sigma =

12.3922	0
0	3.9285

2-(e).
M =

1.5099	2.0787	2.6474
2.8936	3.9836	5.0736
2.6412	3.6361	4.6310
1.6361	2.2524	2.8687
2.3279	3.2049	4.0818

2-(f)
original energy = 169
expectation matrix energy = 153.5670 retained.

3.
[1.7400 2.8400]

4.
There are only 3 independent row vector.
[1,1,1,0,0], [0,1,0,2,2], [0,0,0,5,5]
So the row vector space's dimension is 3.

There are only 3 independent column vector too.
[1;3;4;5;0;0;0], [1;3;4;5;2;0;1], [0;0;0;4;5;2]
So the column vector space's dimension is 3

So the rank of matrix is 3