Lab 12: SVD

Dimension reduction, toy example

```
A = [1 2 3;4 5 6; 7 8 9]
```

```
A = 3×3
     1     2     3
     4     5     6
     7     8     9
```

```
Rank = rank(A)
```

```
Rank = 2
```

```
[U,S,V] = svd(A)
```

```
U = 3×3
   -0.2148    0.8872    0.4082
   -0.5206    0.2496   -0.8165
   -0.8263   -0.3879    0.4082
S = 3×3
   16.8481         0         0
         0    1.0684         0
         0         0    0.0000
V = 3×3
   -0.4797   -0.7767   -0.4082
   -0.5724   -0.0757    0.8165
   -0.6651    0.6253   -0.4082
```

```
% Find full A again
A_full = U*S*V'
```

```
A_full = 3×3
    1.0000    2.0000    3.0000
    4.0000    5.0000    6.0000
    7.0000    8.0000    9.0000
```

```
% Reduce 3 el from S
A_2 =U(:,1:2)*S(1:2,1:2)*V(:,1:2)'
```

```
A_2 = 3×3
    1.0000    2.0000    3.0000
    4.0000    5.0000    6.0000
    7.0000    8.0000    9.0000
```

```
% reduce all columns exept 1 one
A_1=U(:,1)*S(1,1)*V(:,1)'
```

```
A_1 = 3×3
    1.7362    2.0717    2.4073
    4.2072    5.0202    5.8332
    6.6781    7.9686    9.2592
```

```
%result - dim the same, but info and rank changes
Rank_new = rank(A_1)
```

```
Rank_new = 1
```