

# Practice Problems

## Question 1

```
A = randi([0 9],20,20)
```

```
A = 20x20
```

```
4     4     6     0     0     1     0     7     0     8     4     7     4 ...
4     2     8     7     9     5     1     0     9     7     5     1     5
2     3     6     6     3     6     6     9     7     4     2     7     1
4     9     4     8     8     3     3     9     7     3     4     2     1
0     0     9     5     4     6     3     6     0     0     3     2     9
5     1     5     6     5     8     7     9     1     8     1     2     9
0     3     2     1     4     2     3     3     2     1     9     9     3
8     8     6     2     5     2     6     9     8     0     3     3     8
8     2     3     0     1     1     4     0     9     2     8     6     9
3     9     7     4     5     5     2     4     9     9     0     0     8
⋮
```

```
rank(A)
```

```
ans =
20
```

## Question 2

```
A = randi([0 9],5,5);
B = randi([0 9],5,5);
```

**A)**

```
rank(A)
```

```
ans =
5
```

**B)**

```
rank(B)
```

```
ans =
5
```

**C)**

```
rank(A+B)
```

```
ans =
5
```

**D)**

```
rank(A-B)
```

```
ans =  
5
```

**E)**

```
rank(A*B)
```

```
ans =  
5
```

**F)**

```
k = 5;  
rank(k.*B)
```

```
ans =  
5
```

## Question 3

```
% Generate a 5x5 matrix A of rank 4.  
A = randi([0 20],5,5);  
A(:,1) = 0
```

```
A = 5x5  
    0     0     7    14     3  
    0    19     6    16    17  
    0    10    20     5     3  
    0     9     9     5    20  
    0    10    15    15    15
```

```
A
```

```
A = 5x5  
    0     0     7    14     3  
    0    19     6    16    17  
    0    10    20     5     3  
    0     9     9     5    20  
    0    10    15    15    15
```

**A)**

```
A(3,5)
```

```
ans =  
3
```

**B)**

```
b = A(1,:) 
```

```
b = 1x5  
    0     0     7    14     3
```

C)

```
C = A([1 3],:)
```

C = 2x5

|   |    |    |    |   |
|---|----|----|----|---|
| 0 | 0  | 7  | 14 | 3 |
| 0 | 10 | 20 | 5  | 3 |

D)

```
d = A ( :, 2)
```

d = 5x1

|    |
|----|
| 0  |
| 19 |
| 10 |
| 9  |
| 10 |

E)

```
E = A (:, [ 2, 4])
```

E = 5x2

|    |    |
|----|----|
| 0  | 14 |
| 19 | 16 |
| 10 | 5  |
| 9  | 5  |
| 10 | 15 |

## Question 4

```
A = randi([0 100],9,9);  
A([1 2 3 4 5 6 7],:) = 0
```

A = 9x9

|    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|
| 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 26 | 75 | 8  | 52 | 81 | 33 | 52 | 95 | 89 |
| 2  | 68 | 87 | 30 | 86 | 64 | 71 | 41 | 10 |

A

A = 9x9

|    |    |   |    |    |    |    |    |    |
|----|----|---|----|----|----|----|----|----|
| 0  | 0  | 0 | 0  | 0  | 0  | 0  | 0  | 0  |
| 0  | 0  | 0 | 0  | 0  | 0  | 0  | 0  | 0  |
| 0  | 0  | 0 | 0  | 0  | 0  | 0  | 0  | 0  |
| 0  | 0  | 0 | 0  | 0  | 0  | 0  | 0  | 0  |
| 0  | 0  | 0 | 0  | 0  | 0  | 0  | 0  | 0  |
| 0  | 0  | 0 | 0  | 0  | 0  | 0  | 0  | 0  |
| 0  | 0  | 0 | 0  | 0  | 0  | 0  | 0  | 0  |
| 26 | 75 | 8 | 52 | 81 | 33 | 52 | 95 | 89 |

```
2    68    87    30    86    64    71    41    10
```

```
B = A + transpose(A)
```

```
B = 9x9
```

```
0    0    0    0    0    0    0    26    2
0    0    0    0    0    0    0    75    68
0    0    0    0    0    0    0    8    87
0    0    0    0    0    0    0    52    30
0    0    0    0    0    0    0    81    86
0    0    0    0    0    0    0    33    64
0    0    0    0    0    0    0    52    71
26    75    8    52    81    33    52    190    130
2    68    87    30    86    64    71    130    20
```

```
rank(B)
```

```
ans =
4
```

## Question 5

```
A = randi([0 100],10,5);
A([1 2 3 4 5 6 7],:) = 0
```

```
A = 10x5
```

```
0    0    0    0    0
0    0    0    0    0
0    0    0    0    0
0    0    0    0    0
0    0    0    0    0
0    0    0    0    0
0    0    0    0    0
60    33    61    30    41
92    9    85    2    23
13    44    70    17    82
```

```
rank(A)
```

```
ans =
3
```

## A)

```
S1 = A*transpose(A)
```

```
S1 = 10x10
```

```
0    0    0    0    0    0 ...
0    0    0    0    0    0
0    0    0    0    0    0
0    0    0    0    0    0
0    0    0    0    0    0
0    0    0    0    0    0
0    0    0    0    0    0
0    0    0    0    0    0
0    0    0    0    0    0
0    0    0    0    0    0
```

```
S2 = transpose(A)*A
```

S2 = 5x5

|       |      |       |      |       |
|-------|------|-------|------|-------|
| 12233 | 3380 | 12390 | 2205 | 5642  |
| 3380  | 3106 | 5858  | 1756 | 5168  |
| 12390 | 5858 | 15846 | 3190 | 10196 |
| 2205  | 1756 | 3190  | 1193 | 2670  |
| 5642  | 5168 | 10196 | 2670 | 8934  |

**B)**

```
rank(S1)
```

```
ans =  
3
```

```
rank(S2)
```

```
ans =  
3
```