

MSE, MATLAB으로 배우는 공학 수치해석(개정판)

[연습문제 답안 이용 안내]

- 본 연습문제 답안의 저작권은 한빛아카데미(주)에 있습니다.
- 이 자료를 무단으로 전제하거나 배포할 경우 저작권법 136조에 의거하여 최고 5년 이하의 징역 또는 5천만원 이하의 벌금에 처할 수 있고 이를 병과(併科)할 수도 있습니다.

Chapter 04 연습문제 풀이

4.1

$$\mathbf{A} = \begin{bmatrix} 3 & -1 & 2 & -3 \\ 1 & 2 & -1 & -2 \\ -1 & -2 & 7 & 2 \\ -1 & 1 & -4 & 1 \end{bmatrix}, \quad \mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}, \quad \mathbf{c} = \begin{bmatrix} -1 \\ 3 \\ 4 \\ -2 \end{bmatrix}$$

4.2

$$\mathbf{C}^T = \begin{bmatrix} 1 & 1 & -3 \\ 4 & 5 & -5 \\ -4 & 2 & -6 \end{bmatrix}$$

```
Command Window
>> A=[2 4 -3;1 6 1;-1 -2 -3];
>> B=[1 0 1;0 1 -1;2 3 3];
>> C=A-B

C =

     1     4    -4
     1     5     2
    -3    -5    -6

>> C'

ans =

     1     1    -3
     4     5    -5
    -4     2    -6
```

4.3

```
Command Window
>> A=[2 4 -3;1 6 1;-1 -2 -3];
>> B=[1 0 1;0 1 -1;2 3 3];
>> C=A-B;
>> (A+B)+C

ans =

     4     8    -6
     2    12     2
    -2    -4    -6

>> A+(B+C)

ans =

     4     8    -6
     2    12     2
    -2    -4    -6
```

4.4

곱셈에 대한 교환 법칙 $\mathbf{AB} = \mathbf{BA}$ 는 성립 되지 않는다.

$$\mathbf{AB} = \begin{bmatrix} (-7) \times 11 + (-8) \times (-9) & (-7) \times 5 + (-8) \times (-4) \\ 6 \times 11 + 2 \times (-9) & 6 \times 5 + 2 \times (-4) \end{bmatrix} = \begin{bmatrix} -5 & -3 \\ 48 & 22 \end{bmatrix}$$
$$\mathbf{BA} = \begin{bmatrix} 11 \times (-7) + 5 \times 6 & 11 \times (-8) + 5 \times 2 \\ (-9) \times (-7) + (-4) \times 6 & (-9) \times (-8) + (-4) \times 2 \end{bmatrix} = \begin{bmatrix} -47 & -78 \\ 39 & 64 \end{bmatrix}$$

```
Command Window
>> A=[-7 -8;6 2];
>> B=[11 5;-9 -4];
>> A*B

ans =

    -5    -3
    48    22

>> B*A

ans =

   -47   -78
    39    64
```

4.5

```
Command Window
>> A=[-7 -5 2;10 6 1;3 -9 8];
>> B=[3 -2 1;6 8 -5;7 9 10];
>> C=[6 9 -4;7 5 3;-8 2 1];
>> (A+B)*C

ans =

    -582    -297    162
     777     822   -191
   -1000     325     66

>> A*(B+C)

ans =

    -582    -297    162
     777     822   -191
   -1000     325     66
```

4.6

$$\mathbf{A}^{-1} = \frac{1}{3} \begin{bmatrix} 5 & 2 & -1 \\ -2 & 1 & 1 \\ -2 & -2 & 1 \end{bmatrix} = \begin{bmatrix} 1.6667 & 0.6667 & -0.3333 \\ -0.6667 & 0.3333 & 0.3333 \\ -0.6667 & -0.6667 & 0.3333 \end{bmatrix}$$

```
Command Window
>> A=[1,0,1;0,1,-1;2,2,3];
>> det(A)

ans =

     3

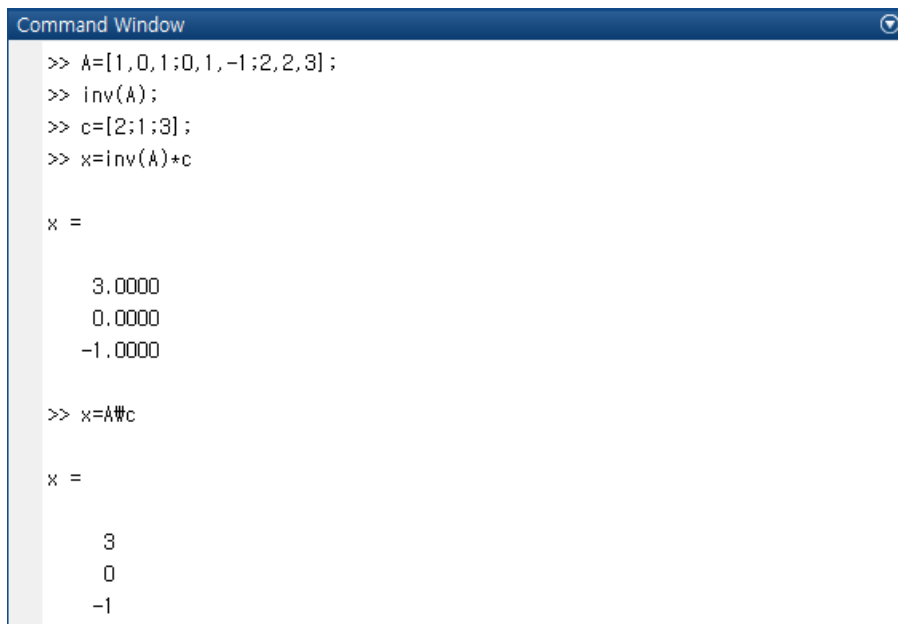
>> inv(A)

ans =

    1.6667    0.6667   -0.3333
   -0.6667    0.3333    0.3333
   -0.6667   -0.6667    0.3333
```

4.7

$$x_1 = 3, x_2 = 0, x_3 = -1$$



```
Command Window
>> A=[1,0,1;0,1,-1;2,2,3];
>> inv(A);
>> c=[2;1;3];
>> x=inv(A)*c

x =

    3.0000
    0.0000
   -1.0000

>> x=A\c

x =

     3
     0
    -1
```

4.8

$$x_1 = 3, x_2 = 0, x_3 = -1$$

4.9

$$x_3 = 0, x_2 = -1, x_1 = 1$$

4.10

$$x_4 = 0, x_3 = 2, x_2 = 0, x_1 = 1$$

4.11

```

Command Window
>> A=[1,-1,0,0;-1,5,2,0;0,2,2,2;0,0,2,8];
>> c=[1;3;4;4];
>> Gauss(A,c)

ans =

     1
     0
     2
     0

```

4.12

$$x_4 = 4, x_3 = 3, x_2 = 2, x_1 = 1$$

4.13

$$\mathbf{A}^{-1} = \begin{bmatrix} -0.7 & 0.2 & 0.3 \\ -1.3 & -0.2 & 0.7 \\ 0.8 & 0.2 & -0.2 \end{bmatrix}$$

4.14

$$A^{-1} = \begin{bmatrix} -0.7 & 0.2 & 0.3 \\ -1.3 & -0.2 & 0.7 \\ 0.8 & 0.2 & -0.2 \end{bmatrix}$$

4.15

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} -8 \\ 3/2 \\ 25/2 \end{bmatrix}$$

4.16

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} -8 \\ 3/2 \\ 25/2 \end{bmatrix}$$

4.17

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 2 \\ 10 \\ 3 \\ -5 \end{bmatrix}$$

4.18

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 2 \\ 10 \\ 3 \\ -5 \end{bmatrix}$$

4.19

```
Command Window
>> A=[1,5,-1,6;2,-1,1,-2;-1,4,-1,3;3,-7,-2,1];
>> [L,U,P]=lu(A)

L =

    1.0000         0         0         0
    0.3333    1.0000         0         0
    0.6667    0.5000    1.0000         0
   -0.3333    0.2273   -0.6364    1.0000

U =

         I
    3.0000   -7.0000   -2.0000    1.0000
         0    7.3333   -0.3333    5.6667
         0         0    2.5000   -5.5000
         0         0         0   -1.4545

P =

    0     0     0     1
    1     0     0     0
    0     1     0     0
    0     0     1     0
```

```
Command Window
>> c=[19;7;20;-75];
>> d=P*c

d =

    -75
     19
      7
     20

>> y=L*d

y =

   -75.0000
    44.0000
    35.0000
     7.2727

>> x=U*y

x =

     2.0000
    10.0000
     3.0000
    -5.0000
```