

8.2

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(a)  $A: 3 \times 2$     (b) square: B, E  
 $B: 3 \times 3$     column: C  
 $C: 3 \times 1$     row: G  
 $D: 2 \times 4$     (c)  $a_{12} = 7$   
 $E: 3 \times 3$      $b_{23} = 7$   
 $F: 2 \times 3$      $d_{32} = \text{undefined}$   
 $G: 1 \times 3$      $e_{22} = 2$   
                   $f_{12} = 0$   
                   $g_{12} = 6$

(d)

(1)  $E+B = \begin{bmatrix} 5 & 8 & 15 \\ 8 & 4 & 10 \\ 6 & 0 & 10 \end{bmatrix}$

(2)  $A+F = \text{undefined}$

(3)  $B-E = \begin{bmatrix} 3 & -2 & -1 \\ -6 & 0 & 4 \\ -2 & 0 & -2 \end{bmatrix}$

(4)  $G \times B = \begin{bmatrix} 28 & 21 & 49 \\ 7 & 14 & 49 \\ 14 & 0 & 28 \end{bmatrix}$

(5)  $C^T = \{3 \ 6 \ 1\}$

(6)  $E \times B = \begin{bmatrix} 4+5+16 & 3+10 & 7+35+32 \\ 28+2+6 & 21+4 & 49+14+12 \\ 16+0+12 & 12+0+0 & 28+0+24 \end{bmatrix}$   
 $= \begin{bmatrix} 25 & 13 & 74 \\ 36 & 25 & 75 \\ 28 & 12 & 52 \end{bmatrix}$

(7)  $B \times A = \begin{bmatrix} 16+3+35 & 28+6+42 \\ 4+2+35 & 7+4+42 \\ 8+0+20 & 14+0+24 \end{bmatrix} = \begin{bmatrix} 54 & 76 \\ 41 & 53 \\ 28 & 38 \end{bmatrix}$

(8)  $D^T = \begin{bmatrix} 9 & 2 \\ 4 & -1 \\ 3 & 7 \\ -6 & 5 \end{bmatrix}$  (9)  $A \times C = \text{undefined}$

(10)  $I \times B = B = \begin{bmatrix} 4 & 3 & 7 \\ 1 & 2 & 7 \\ 2 & 0 & 4 \end{bmatrix}$

(11)  $E^T E = \begin{bmatrix} 1 & 7 & 4 \\ 5 & 2 & 0 \\ 8 & 3 & 6 \end{bmatrix} \begin{bmatrix} 158 \\ 723 \\ 406 \end{bmatrix}$

$= \begin{bmatrix} 1+49+16 & 5+14 & 8+21+24 \\ 5+14 & 25+4 & 40+6 \\ 8+21+24 & 40+6 & 64+9+36 \end{bmatrix}$

$= \begin{bmatrix} 66 & 19 & 53 \\ 19 & 29 & 46 \\ 53 & 46 & 109 \end{bmatrix}$

(12)  $C^T C = \{3 \ 6 \ 1\} \begin{Bmatrix} 3 \\ 6 \\ 1 \end{Bmatrix} = \{9+36+1\} = \{46\}$

### 8.3

$$\begin{bmatrix} 0 & -7 & 5 \\ 0 & 4 & 7 \\ 4 & -3 & 7 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 50 \\ -30 \\ -40 \end{bmatrix} \quad AX = C$$

소스파일 : linearEquation.m

```
A = [0 -7 5;0 4 7;4 -3 7];
C = [50 -30 -40]';
transpose = @(A) [A(1,:)' A(2,:)' A(3,:)'];
det2 = @(A) A(1,1)*A(2,2)-A(1,2)*A(2,1);
minor = @(A,i,j) A(1:3 ~i,1:3 ~j);
det = @(A)
A(1,1)*det2(minor(A,1,1))-A(1,2)*det2(minor(A,1,2))+A(1,3)*det2(minor(A,1,3));

Sol = linEqu(A,C)
Atran = transpose(A)
Ainv = inverse(A)
AbySol= A*Sol
AbyAinv = A*Ainv

function repA = replace(A,i,B)
repA = A;
repA(:,i) = B;
end

function sol = linEqu(A,C)
sol = zeros(3,1);
for i = 1:3
    sol(i) = det(replace(A,i,C))/det(A);
end
end

function inv = inverse(A)
inv = [linEqu(A,[1 0 0]') linEqu(A,[0 1 0]') linEqu(A,[0 0 1]')];
end
```

실행결과

```
명령 창
>> linearEquation

Sol =

-15.1812
-7.2464
-0.1449

Atran =

0 0 4
-7 4 -3
5 7 7

Ainv =

-0.1775 -0.1232 0.2500
-0.1014 0.0725 0
0.0580 0.1014 0

AbySol =

50.0000
-30.0000
-40.0000

AbyAinv =

1.0000 0 0
-0.0000 1.0000 0
-0.0000 0 1.0000
```

8.4  
(a)

$$AB = \begin{bmatrix} 6 & -1 \\ 12 & 8 \\ -5 & 4 \end{bmatrix} \begin{bmatrix} 40 \\ 0.52 \end{bmatrix}$$

$$= \begin{bmatrix} 24 - 0.5 & -2 \\ 48 + 4 & 16 \\ -20 + 2 & 8 \end{bmatrix} = \begin{bmatrix} 23.5 & -2 \\ 52 & 16 \\ -18 & 8 \end{bmatrix}$$

$$BA = \begin{bmatrix} 40 \\ 0.52 \end{bmatrix} \begin{bmatrix} 6 & -1 \\ 12 & 8 \\ -5 & 4 \end{bmatrix} = \text{undefined}$$

$$AC = \begin{bmatrix} 6 & -1 \\ 12 & 8 \\ -5 & 4 \end{bmatrix} \begin{bmatrix} 2 & -2 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} 12-3 & -12-1 \\ 24+24 & -24+8 \\ -10+12 & 10+4 \end{bmatrix}$$

$$= \begin{bmatrix} 9 & -13 \\ 48 & -16 \\ 2 & 14 \end{bmatrix}$$

$$CA = \begin{bmatrix} 2 & -2 \\ 3 & 1 \end{bmatrix} \begin{bmatrix} 6 & -1 \\ 12 & 8 \\ -5 & 4 \end{bmatrix} = \text{undefined}$$

$$BC = \begin{bmatrix} 40 \\ 0.52 \end{bmatrix} \begin{bmatrix} 2 & -2 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} 8 & -8 \\ 1.6 & -1.2 \end{bmatrix} = \begin{bmatrix} 8 & -8 \\ 2 & 1 \end{bmatrix}$$

$$CB = \begin{bmatrix} 2 & -2 \\ 3 & 1 \end{bmatrix} \begin{bmatrix} 40 \\ 0.52 \end{bmatrix} = \begin{bmatrix} 8-1 & -4 \\ 12+0.52 \end{bmatrix} = \begin{bmatrix} 7 & -4 \\ 12.52 \end{bmatrix}$$

(b) BA 미가 B: 2x2  
A: 3x2

B의 열수 ≠ A의 행수 ∴ 곱할 수 없다.

CA 미가 C: 2x2

A: 3x2

C의 열수 ≠ A의 행수 ∴ 곱할 수 없다.

(c)

AB와 BA

또는 AC와 CA처럼

곱셈 순서를 바꾸면 계산이 안될 수 있다.

BC와 CB처럼

계산 결과가 다를 수 있다.

∴ 행렬 곱셈의 계산 순서는 중요하다.