

수치해석 HW#5

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8.3

```
>> A = [0 7 -5; 0 4 7; -4 3 -7];
>> b = [-50 -30 40]';
>> A = inv(A);
>> x = A*b
```

x =

```
-15.1812
-7.2464
-0.1449
```

8.14

① $V_{43} + V_{32} + V_{25} + V_{54} = 0$
 $\Rightarrow 2I_1 + 20I_1 + 5(I_1 - I_2) + 5I_1 = 0$
 AND MATRICES ② $10I_2 + 40I_2 + 25I_2 - 5(I_1 - I_2) = 0$

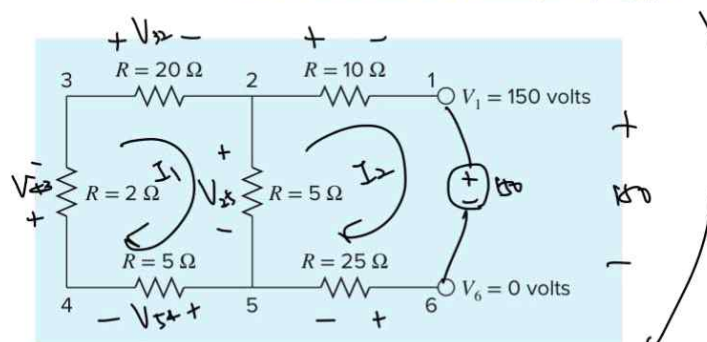


FIGURE P8.14

① $32I_1 - 5I_2 = 0$
 ② $-5I_1 + 40I_2 = -150$

폰 방법

```
>> A = [32 -5; -5 40];
>> b = [0 -150]';
>> x = inv(A)*b
```

x =

```
-0.5976
-3.8247
```

나온 행렬을 대입

8.15

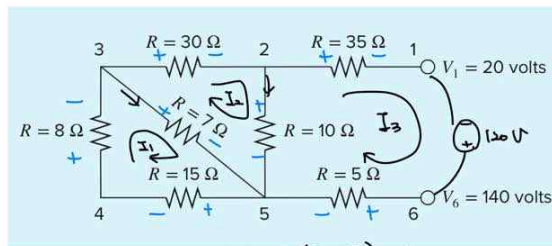


FIGURE P8.15

$$\begin{aligned} \textcircled{1} \quad 8I_1 + 17(I_1 - I_2) + 15I_1 &= 0 \quad \rightarrow \quad 30I_1 - 17I_2 = 0 \\ \textcircled{2} \quad 30I_2 + 10(I_2 - I_3) - 17(I_1 - I_2) &= 0 \quad \rightarrow \quad -17I_1 + 47I_2 - 10I_3 = 0 \\ \textcircled{3} \quad 15I_3 - 120 + 5I_3 - 10(I_2 - I_3) &= 0 \quad \rightarrow \quad -10I_2 + 20I_3 = 120 \end{aligned}$$

풀 방법

```
>> A = [30 -17 0; -17 47 -10; 0 -10 20];
>> b = [0 0 120]';
>> x = inv(A)*b
```

x =

0.1291
0.5534
2.5107

나온 행렬을 대입

9.7

9.7 Given the equations

$$\begin{aligned} 2x_1 - 6x_2 - x_3 &= -38 \\ -3x_1 - x_2 + 7x_3 &= -34 \\ -8x_1 + x_2 - 2x_3 &= -20 \end{aligned}$$

- (a) Solve by Gauss elimination with partial pivoting. As part of the computation, use the **diagonal elements** to calculate the determinant. Show all steps of the computation.
- (b) Substitute your results into the original equations to check your answers.

$$\text{Sol} \rightarrow \left[\begin{array}{ccc|c} 2 & -6 & -1 & -38 \\ -3 & -1 & 7 & -34 \\ -8 & 1 & -2 & -20 \end{array} \right] \Rightarrow \left[\begin{array}{ccc|c} 2 & -6 & -1 & -38 \\ 0 & -20 & 11 & -182 \\ -8 & 1 & -2 & -20 \end{array} \right]$$

$$\Rightarrow \left[\begin{array}{ccc|c} 2 & -6 & -1 & -38 \\ 0 & -20 & 11 & -182 \\ 0 & -23 & -6 & -172 \end{array} \right] \Rightarrow \left[\begin{array}{ccc|c} 2 & -6 & -1 & -38 \\ 0 & -20 & 11 & -182 \\ 0 & 0 & 33 & -146 \end{array} \right]$$

$$\therefore \left. \begin{aligned} 2x_1 - 6x_2 - x_3 &= -38 \\ -20x_2 + 11x_3 &= -182 \\ x_3 &= -2 \end{aligned} \right\} \quad x_3 = -2, x_2 = 8, x_1 = 4.$$

```
>> A = [2 -6 -1; -3 -1 7; -8 1 -2];
>> det(A)
```

```
ans =
```

```
373.0000
```

```
>> b = [-38 -34 -20]';
```

```
>> x = A\b
```

```
x =
```

```
4
8
-2
```

det(A)는 왜 다른지 모르겠다. 행변환을 어떻게 하느냐에 따라 다르지 않을까? 조금 더 공부해야겠다.

9.12

$$\left. \begin{aligned} \frac{d^2 c}{dx^2} &= \frac{C_{n+1} - 2C_n + C_{n-1}}{\Delta x^2} \\ \frac{dc}{dx} &= \frac{C_{n+1} - C_{n-1}}{2\Delta x} \end{aligned} \right\} \Delta x = 1$$

$$\therefore 2c'' - c' - 0.2c = 0$$

$$\Rightarrow 2(C_{n+1} - 2C_n + C_{n-1}) - (C_{n+1} - C_{n-1}) - 0.2C_n = 0$$

$$\begin{array}{ccc} 2 & & \\ & 5 & \\ & & -2 \end{array}$$

$$15C_{n+1} - 32C_n + 15C_{n-1} = 0$$

$$\Rightarrow 15C_2 - 32C_1 + 15C_0 = 0 \Rightarrow 15C_2 - 32C_1 + 1200 = 0$$

$$\Rightarrow 32C_1 - 15C_2 = 1200$$

$$32C_2 - 15C_3 - 15C_1 = 0$$

$$32C_3 - 15C_4 - 15C_2 = 0$$

$$\vdots$$

$$32C_p - 15C_{p+1} - 15C_{p-1} = 0$$

$$\Rightarrow 32C_p - 15C_{p+1} = 300$$

$$\begin{pmatrix} 32 & -15 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -15 & 32 & -15 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -15 & 32 & -15 & 0 & 0 & 0 & 0 & 0 \\ & & \vdots & & & & & & \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -15 & 32 \end{pmatrix} \begin{pmatrix} C_1 \\ \vdots \\ C_p \end{pmatrix} = \begin{pmatrix} 1200 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 300 \end{pmatrix}$$

손으로 행렬식 만들기

```

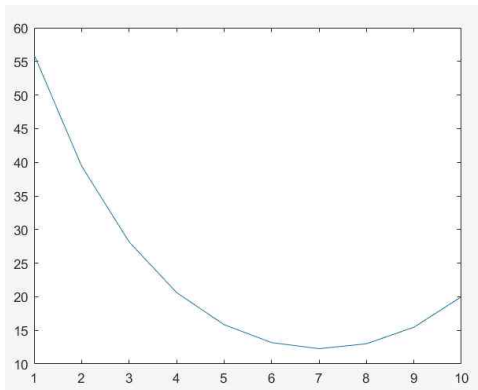
A =
    32   -15    0    0    0    0    0    0    0
   -15    32   -15    0    0    0    0    0    0
    0   -15    32   -15    0    0    0    0    0
    0    0   -15    32   -15    0    0    0    0
    0    0    0   -15    32   -15    0    0    0
    0    0    0    0   -15    32   -15    0    0
    0    0    0    0    0   -15    32   -15    0
    0    0    0    0    0    0   -15    32   -15
    0    0    0    0    0    0    0   -15    32

b =
    1200
         0
         0
         0
         0
         0
         0
         0
    300

>> c = A\b
c =
    55.9903
    39.4460
    28.1611
    20.6311
    15.8519
    13.1863
    12.2788
    13.0086
    15.4728

```

손으로 푼 수식대로 행렬입력



plot 결과