Chapter 7 Linear Algebra: Matrices, Vectors, Determinants. Linear Systems

P261 - Problem set 7.1

1. 2x2: $a_{11} \neq b_{11}, b_{12} \neq c_{12}$, 2x3: $d_{11} \neq e_{11}$
2. $a_{31} = 10,\ \ a_{13} = 81\ \ , a_{26} = 96,\ \ a_{33} = 0$
3. E1: 3x3, 3x4,
   E2: 3x7,
   E3: 2x2, 2x2, 2x2, 2x3, 2x3,
   E5:3x2
4. 1A: 4, 0, 1
   3A: a_{11}, a_{22}
   3B: 4, -1
5. $B = \frac{1}{5}A$,
   $B = \frac{1}{10}A$
6. $B = \frac{1}{1.609}A$
7. No. No(1x1 as exception?). Yes. Maybe not in math (how about 1x1?) but OK in python. No.
8. $2A + 4B = 4B + 2A = \begin{bmatrix} 0 & 24 & 16 \\ 32 & 22 & 26 \\ -6 & 16 & -14 \end{bmatrix}$
   B
   $0.4B - 4.2A = \begin{bmatrix} 0 & -6.4 & -16 \\ -23.2 & -19.8 & -19.4 \\ -5 & 1.6 & 11.8 \end{bmatrix}$
9. $3A = \begin{bmatrix} 0 & 6 & 12 \\ 18 & 15 & 15 \\ 3 & 0 & -9 \end{bmatrix}$
   $0.5B = \begin{bmatrix} 0 & 2.5 & 1 \\ 2.5 & 1.5 & 2 \\ -1 & 2 & -1 \end{bmatrix}$
   $3A + 0.5B = \begin{bmatrix} 0 & 8.5 & 13 \\ 20.5 & 16.5 & 17 \\ 2 & 2 & -10 \end{bmatrix}$
   3A+0.5B+C is not defined.

10. $(4 \bullet 3)A = 4(3A) = \begin{bmatrix} 0 & 24 & 48 \\ 72 & 60 & 60 \\ 12 & 0 & -36 \end{bmatrix}$

$14B - 3B = 11B = \begin{bmatrix} 0 & 55 & 22 \\ 55 & 33 & 44 \\ -22 & 44 & -22 \end{bmatrix}$

11. $8C + 10D = 2(5D + 4C) = \begin{bmatrix} 0 & 26 \\ 34 & 32 \\ 28 & -10 \end{bmatrix}$

$0.6C - 0.6D = 0.6(C - D) = \begin{bmatrix} 5.4 & 0.6 \\ -4.2 & 2.4 \\ -0.6 & 0.6 \end{bmatrix}$

12. $(C + D) + E = (D + E) + C = \begin{bmatrix} 1 & 5 \\ 6 & 8 \\ 6 & -2 \end{bmatrix}$

$0(C - E) + 4D = 4D = \begin{bmatrix} -16 & 4 \\ 20 & 0 \\ 8 & -4 \end{bmatrix}$

$A - 0C$: 3x3 can not minus 3x2, not defined

13. $(2 \bullet 7)C = 2(7C) = \begin{bmatrix} 70 & 28 \\ -28 & 56 \\ 14 & 0 \end{bmatrix}$

$-D + 0E = -D = \begin{bmatrix} 4 & -1 \\ -5 & 0 \\ -2 & 1 \end{bmatrix}$

$E - D + C + u$: Since EDC are 3x2 but u is 3x1, not defined.

14. $(5u + 5v) - \frac{1}{2}w = \begin{bmatrix} 5 \\ 30 \\ -10 \end{bmatrix}$

$-20(u + v) + 2w = -4[(5u + 5v) - \frac{1}{2}w] = \begin{bmatrix} -20 \\ -120 \\ 40 \end{bmatrix}$

$E - (u + v)$: 3x2 can not minus 3x1, not defined

$10(u + v) + w = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$

15. $(u + v) - w = u + (v - w) = \begin{bmatrix} 5.5 \\ 33 \\ -11 \end{bmatrix}$

$C + 0w$: 3x2 can not minus 3x1, not defined

$0E + u - v$: 3x2 can not minus 3x1, not defined

16. $15v - 3w - 0u = -3w + 15v = \begin{bmatrix} 0 \\ 135 \\ 0 \end{bmatrix}$

$D - u + 3C$: 3x2 can not minus 3x1, not defined

$8.5w - 11.1u + 0.4v = \begin{bmatrix} 25.45 \\ 256.2 \\ 119.1 \end{bmatrix}$

17. $u + v + w = \begin{bmatrix} -4.5 \\ -27 \\ 9 \end{bmatrix}$

18. $p = 0 - u - v - w = \begin{bmatrix} 4.5 \\ 27 \\ -9 \end{bmatrix}$

19. Metrics with entries a_{ij}, then follow the basic arithmetic rule.

20. b-1: $\begin{bmatrix} -1 & 1 & 0 & -1 & -1 \\ 1 & -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 1 \end{bmatrix}$

b-2: $\begin{bmatrix} 1 & 0 & 0 & 0 & -1 & 1 & -1 \\ -1 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & -1 & 1 & 0 & 0 & -1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 0 & 0 \end{bmatrix}$

c:

Sketch three networks