

1] 次の行列を簡約化せよ.

(1) $\begin{pmatrix} 1 & 2 & -3 \\ 2 & 3 & -4 \end{pmatrix}$ (2) $\begin{pmatrix} 1 & -2 & -7 & 0 \\ 1 & -3 & -10 & -1 \end{pmatrix}$ (3) $\begin{pmatrix} 2 & 2 & -3 & -8 \\ 3 & 3 & -4 & -11 \end{pmatrix}$

(4) $\begin{pmatrix} 1 & 0 & 1 & -2 \\ -2 & -1 & 1 & -7 \\ 2 & 1 & 0 & 4 \end{pmatrix}$ (5) $\begin{pmatrix} 1 & 0 & 2 & -1 \\ 3 & 0 & 1 & -3 \\ -3 & 0 & 1 & 3 \end{pmatrix}$ (6) $\begin{pmatrix} 3 & 2 & 5 & 1 \\ 4 & 1 & 10 & 2 \\ 5 & 2 & 11 & 2 \end{pmatrix}$

(7) $\begin{pmatrix} 1 & 1 & 0 & -1 & 0 \\ 0 & 0 & 1 & -3 & 1 \\ 1 & 1 & 1 & -4 & 1 \\ 1 & 1 & 0 & -1 & 1 \end{pmatrix}$ (8) $\begin{pmatrix} 1 & -1 & 3 & 2 & 2 \\ 2 & -2 & 1 & 2 & 1 \\ 1 & -1 & 2 & 1 & 1 \\ 1 & -1 & 2 & 2 & 2 \end{pmatrix}$

2] 次の連立1次方程式を掃き出し法(基本変形)を用いて解け. 解が存在しない場合には、「解なし」と答えよ.

(1) $\begin{cases} -2x + 5y - 11z = 13 \\ x - 2y + 4z = -5 \\ -x + 2z = -1 \end{cases}$ (2) $\begin{cases} x + 4y + z = 2 \\ 2x + 4y = 0 \\ x + 6y + 3z = 7 \end{cases}$ (3) $\begin{cases} -2x - 3y - 2z = 0 \\ 2x + y + 3z = -1 \\ 2y - z = -2 \end{cases}$

(4) $\begin{cases} 2x + 2y - z = 6 \\ -2x - y = -5 \\ -2x - 4y + 3z = -8 \end{cases}$ (5) $\begin{cases} 3x - 3y + 6z = 3 \\ -2x + 2y - 4z = -2 \\ x - y + 2z = 1 \end{cases}$ (6) $\begin{cases} x + 2y + z + 4w = 1 \\ -x + y + 2z - w = 2 \\ 2x + 5y + 3z + 9w = 3 \end{cases}$

(7) $\begin{cases} 2a + 4b + 3c + 5d = 4 \\ a + 2b + 2c + 3d = 3 \\ -a - 2b - c - 2d = -1 \end{cases}$ (8) $\begin{cases} x + y - z + 4w = 5 \\ x + 3y - z + 8w = 7 \\ -2x - 2y + 3z - 3w = -8 \\ x - y - 3z + 10w = 7 \end{cases}$

0解答:

1] (1) $\begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & -2 \end{pmatrix}$ (2) $\begin{pmatrix} 1 & 0 & -1 & 2 \\ 0 & 1 & 3 & 1 \end{pmatrix}$ (3) $\begin{pmatrix} 1 & 1 & 0 & -1 \\ 0 & 0 & 1 & 2 \end{pmatrix}$ (4) $\begin{pmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & -3 \end{pmatrix}$

(5) $\begin{pmatrix} 1 & 0 & 0 & -1 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}$ (6) $\begin{pmatrix} 1 & 0 & 3 & 0 \\ 0 & 1 & -2 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$ (7) $\begin{pmatrix} 1 & 1 & 0 & -1 & 0 \\ 0 & 0 & 1 & -3 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$ (8) $\begin{pmatrix} 1 & -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$

2] 以下の解答内の s と t はいずれも任意の定数.

(1) $\begin{cases} x = 1 + 2t \\ y = 3 + 3t \\ z = t \end{cases}$ (2) $\begin{cases} x = 1 \\ y = -\frac{1}{2} \\ z = 3 \end{cases}$ (3) 解なし (4) $\begin{cases} x = 2 - t \\ y = 1 + 2t \\ z = 2t \end{cases}$ (5) $\begin{cases} x = 1 + s - 2t \\ y = s \\ z = t \end{cases}$

(6) $\begin{cases} x = -1 + s - 2t \\ y = 1 - s - t \\ z = s \\ w = t \end{cases}$ (7) $\begin{cases} a = -1 - 2s - t \\ b = s \\ c = 2 - t \\ d = t \end{cases}$ (8) $\begin{cases} x = \frac{16}{5} \\ y = \frac{1}{5} \\ z = 0 \\ w = \frac{2}{5} \end{cases}$

0※この講義に関する情報はホームページを参照. <http://fuji.ss.u-tokai.ac.jp/nasu/2024/la1.html>