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1 次の連立1次方程式が解を持つように定数 a を決め、そのときの解をすべて求めよ.

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

2 次の連立1次方程式が解を持つための a, b, c, d の間に成り立つべき条件を求め、その条件が満たされるとき、すべての解を求めたい.

$$\begin{cases} x + 2y + 4z + w = a \\ -x - y - z - 3w = b \\ -y - 3z + 3w = c \\ -x + y + 5z - 4w = d \end{cases}$$

いま、この連立1次方程式を行列表示し、行に関する基本変形を行うと下のように変形される.

$$\left(\begin{array}{cccc|c} 1 & 2 & 4 & 1 & a \\ -1 & -1 & -1 & -3 & b \\ 0 & -1 & -3 & 3 & c \\ -1 & 1 & 5 & -4 & d \end{array} \right) \rightarrow \dots \rightarrow \left(\begin{array}{cccc|c} \textcircled{1} & 2 & 4 & 1 & a \\ 0 & \textcircled{1} & 3 & -2 & a+b \\ 0 & 0 & 0 & \textcircled{1} & a+b+c \\ 0 & 0 & 0 & 0 & -5a-6b-3c+d \end{array} \right)$$

この連立1次方程式が解を持つためには a, b, c, d がどのような関係式を満たすことが必要か. また、その関係式が満たされるとき、さらに基本変形を続けることによって、解をすべて求めよ.

3 Three homeowners—a carpenter, an electrician, and a plumber—agree to make repairs in their three homes. They agree to work a total of 10 days each according to the following schedule:

	Work Performed by		
	Carpenter	Electrician	Plumber
Days of Work in Home of Carpenter	2	1	6
Days of Work in Home of Electrician	4	5	1
Days of Work in Home of Plumber	4	4	3

For tax purposes, they must report and pay each other a reasonable daily wage, even for the work each does on his or her own home. Their normal daily wages are about \$100, but they agree to adjust their respective daily wages so that each homeowner will come out even—that is, so that the total amount paid out by each is the same as the total amount each receives. How to set their daily wages?

[From “*Elementary Linear Algebra — Applications Version*” 9th. edition by Howard Anton and Chris Rorres.]