1.2-7
(1)

$$\because (2)-(3)-(1)0=1$$
$$\therefore \rightarrow\leftarrow \text{ contradictory. The system is singular.}$$

(2)
replace 0 with -1
(3)

$$(u,v,w)=(3+t,-1-2t,t)\ t\in R$$
$$\text{Let } t=0$$
$$u=3\ v=-1\ w=0$$

1.3-11
(1)

$$d=10$$

(2)

$$\begin{aligned} 2x+5y+ \quad z&=0\\ y- \quad z&=3\\ - \quad z&=2 \end{aligned}$$

(3)

$$d=11$$

1.4-13

$$(A+B)^2=(A+B)(B+A)=A^2+AB+BA+B^2=A(A+B)+B(A+B)$$

1.5-7

$$Ax=\begin{bmatrix} 2 & 3 & 3\\ 0 & 5 & 7\\ 6 & 9 & 8 \end{bmatrix}\begin{bmatrix} u\\ v\\ w \end{bmatrix}=\begin{bmatrix} 2\\ 2\\ 5 \end{bmatrix}$$
$$A=LU=\begin{bmatrix} 1 & 0 & 0\\ 0 & 1 & 0\\ 3 & 0 & 1 \end{bmatrix}\begin{bmatrix} 2 & 3 & 3\\ 0 & 5 & 7\\ 0 & 0 & -1 \end{bmatrix}$$

$$Lc=b=>\begin{bmatrix} c_1\\ c_2\\ c_3 \end{bmatrix}=\begin{bmatrix} 2\\ 2\\ -1 \end{bmatrix}$$

$$Ux = c$$

$$\begin{bmatrix} 2 & 3 & 3 \\ 0 & 5 & 7 \\ 0 & 0 & -1 \end{bmatrix} x = \begin{bmatrix} 2 \\ 2 \\ -1 \end{bmatrix}$$

1.6-24

Suppose that $I - AB$ is invertible.

Prove that $B(I - AB)^{-1}A + I$ is the inverse of $I - BA$

$$\begin{aligned} (I - BA)(B(I - AB)^{-1}A + I) &= (I - BA)B(I - AB)^{-1}A + I - BA \\ &= B(I - AB)(I - AB)^{-1}A + I - BA \\ &= BA + I - BA \\ &= I \end{aligned}$$

we can also prove $(B(I - AB)^{-1}A + I)(I - BA) = I$

I-BA is invertible.