

1. (a) The product of the two matrices is $4\mathbf{I}$.

(b) The inverse is $\begin{pmatrix} 5 & 7 & 9 \\ 1 & 4 & 8 \\ 5 & 1 & -5 \end{pmatrix}^{-1} = \frac{1}{4} \begin{pmatrix} -28 & 44 & 20 \\ 45 & -70 & -31 \\ -19 & 30 & 13 \end{pmatrix}$.

(c) The solution to the simultaneous equations is $x = 113$, $y = \frac{-713}{4}$ and $z = \frac{303}{4}$.

2. (a) The product of the two matrices is $-4\mathbf{I}$.

(b) The inverse is $\begin{pmatrix} -8 & -3 & -4 \\ -4 & 5 & 2 \\ 0 & 8 & 5 \end{pmatrix}^{-1} = \frac{1}{-4} \begin{pmatrix} 9 & -17 & 14 \\ 20 & -40 & 32 \\ -32 & 64 & -52 \end{pmatrix}$.

(c) The solution to the simultaneous equations is $x = \frac{9}{4}$, $y = -3$ and $z = 6$.

3. (a) The product of the two matrices is \mathbf{I} .

(b) The inverse is $\begin{pmatrix} 2 & 3 & -1 \\ 4 & 7 & 8 \\ -5 & -7 & 8 \end{pmatrix}^{-1} = \begin{pmatrix} 112 & -17 & 31 \\ -72 & 11 & -20 \\ 7 & -1 & 2 \end{pmatrix}$.

(c) The solution to the simultaneous equations is $x = 913$, $y = -587$ and $z = 58$.