

6. Find the point of intersection of each of the following sets of planes.

(iii) $x + y + z = 2$ (1)
 $2x + 3y + z = 7$ (2)
 $\frac{x}{2} - \frac{y}{6} + \frac{z}{3} = \frac{2}{3}$ (3)

Eliminate ys $6 \times (3)$
 $+ (1)$

$$\begin{array}{r} 3x - y + 2z = 4 \\ x + y + z = 2 \\ \hline 4x + 3z = 6 \end{array} \quad (4)$$

Solve (4) & (5)
 Eliminate x s $-3 \times (2)$
 $+ (1)$

$$\begin{array}{r} 2x + 3y + z = 7 \\ -3x - 3y - 3z = -6 \\ \hline -x - 2z = +1 \end{array} \quad (5)$$

Solve (4) & (5)
 Eliminate x s $+4 \times (5)$
 $+4 \times (4)$

$$\begin{array}{r} 4x + 3z = 6 \\ -4x - 8z = 4 \\ \hline -5z = 10 \end{array} \Rightarrow z = -2$$

Sub $z = -2$ into (5)
 -4

$$\begin{array}{r} -x - 2(-2) = 1 \\ -x + 4 = 1 \\ -x = -3 \end{array} \Rightarrow x = 3$$

Sub $x = 3, z = -2$ into (1)
 $3 + y - 2 = 2$
 $y + 1 = 2 \Rightarrow y = 1$

Intersection point $(3, 1, -2)$

(b) Solve the simultaneous equations;

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 [15 marks]
 7 minutes

$$\begin{array}{l} x + y + z = 16 \quad (1) \\ \frac{5}{2}x + y + 10z = 40 \quad (2) \\ 2x + \frac{1}{2}y + 4z = 21 \quad (3) \end{array}$$

Eliminate ys $2 \times (2)$
 $-2 \times (1)$

$$\begin{array}{r} 5x + 2y + 20z = 80 \\ -2x - 2y - 2z = -32 \\ \hline 3x + 18z = 48 \end{array} \quad (4)$$

Solve (4) and (5)
 Eliminate x s $2 \times (3)$
 $- (4)$

$$\begin{array}{r} 4x + y + 8z = 42 \\ -x - y - z = -16 \\ \hline 3x + 7z = 26 \end{array} \quad (5)$$

Solve (4) and (5)
 Eliminate x s $-3 \times (5)$
 $+4 \times (4)$

$$\begin{array}{r} 3x + 18z = 48 \\ -3x - 7z = -26 \\ \hline 11z = 22 \end{array} \Rightarrow z = 2$$

Sub $z = 2$ into (5)
 $3x + 7(2) = 26$
 $3x + 14 = 26$
 $3x = 12 \Rightarrow x = 4$

Sub $x = 4$ and $z = 2$
 into (1)
 $4 + y + 2 = 16$
 $y + 6 = 16 \Rightarrow y = 10$