PROBLEM SET 6

1. $R = (6, -5, 2) + \langle 1, 3, -\frac{2}{3} \rangle t$

$x = 6 + t$
$y = -5 + 3t$
$z = 2 - \frac{2}{3}t$

2. $x = 1.0 + 1.6t$
$y = 2.4 - 1.2t$
$z = 4.6 - 4.3t$

$t = \frac{x - 1.0}{1.6} = \frac{y - 2.4}{-1.2} = \frac{z - 4.6}{-4.3}$

3. $L_1 = (3, 4, 1) + \langle 2, -1, 3 \rangle t$
$L_2 = (1, 3, 4) + \langle 4, -2, 5 \rangle s$

NOT PROPORTIONAL, SO NOT PARALLEL

$x_1 = 3 + 2t$ so $s = \frac{t}{2} + \frac{1}{2}$
$x_2 = 1 + 4s$

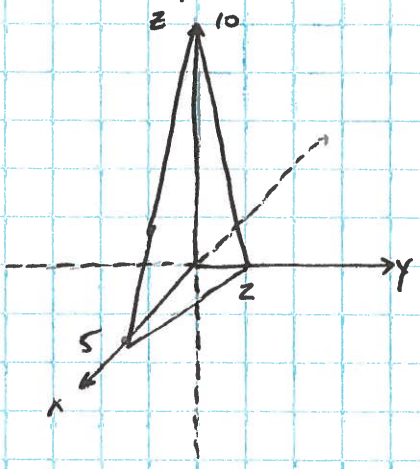
$y_1 = 4 - t$ so $s = \frac{t}{2} - \frac{1}{2}$
$y_2 = 3 - 2s$

LINES ARE SKEW

4. $(2)(x - 5) + (1)(y - 3) + (-1)(z - 5) = 0$

$2x + y - z - 8 = 0$

5.



6. $(3-t)-(2+t)+2(5t)=9$

$t=1 \qquad P=(2,3,5)$

7. $n_1 = \langle 1, 4, -3 \rangle$

$n_2 = \langle -3, 6, 7 \rangle$

$n_1 \cdot n_2 = -3+24-21=0$ so PERPENDICULAR

8. THE INTERSECTING LINE CROSSES THE X-Y PLANE AT $z=0$:

$x+y=1$ so $x=1$

$x+2y=1$ $y=0$

$$n_1 \times n_2 = \begin{vmatrix} i & j & k \\ 1 & 1 & 1 \\ 1 & 2 & 2 \end{vmatrix} = -j+k$$

$x=1$

$y=-t$

$z=t$

$n_1 \cdot n_2 = |n_1||n_2| \cos\theta$

$5 = \sqrt{3} \cdot \sqrt{9} \cdot \cos\theta$

$\theta = 15.8°$

9. POINT $(1,-2,4)$ PLANE $3x+2y+6z-5=0$

$x \; y \; z$ $\qquad$ $a \; b \; c \; d$

$$D = \frac{|(3\cdot 1)+(2\cdot -2)+(6\cdot 4)+(-5)|}{\sqrt{3^2+2^2+6^2}} = \frac{18}{7}$$

10. IN PLANE 1, LET $y=0$, $z=0$ SO $x=2$

POINT $(2,0,0)$ ($x\ y\ z$) AND PLANE $4x-6y+2z-3=0$ ($a\ b\ c\ d$)

$$D=\frac{|(4\cdot 2)+(-6\cdot 0)+(2\cdot 2)+(-3)|}{\sqrt{4^2+6^2+2^2}}=\frac{5}{2\sqrt{14}}$$