7. Find parametric equations for the line through the point $(0, 1, 2)$ that is parallel to the plane $x + y + z = 2$ and perpendicular to the line $x = 1 + t,\ y = 1 - t,\ z = 2t$.

$\langle 1, 1, 1 \rangle \times \langle 1, -1, 2 \rangle$

$= \langle 2+1, 2-1, -1-1 \rangle$

$\langle 3, 1, -2 \rangle$

$\frac{x-0}{3} = \frac{y-1}{1} = \frac{z-2}{-2}$

8. Which of the following four lines parallel? Are any of them identical?

$L_1 : x = 1 + 6t,\ y = 1 - 3t,\ z = 12t + 5$

$L_2 : x = 1 + 2t,\ y = t,\ z = 1 + 4t$

$L_3 : 2x - 2 = 4 - 4y = z + 1$

$L_4 : \mathbf{r} = \langle 3, 1, 5 \rangle + t\langle 4, 2, 8 \rangle$

L_2, L_4

9. Determine whether the planes are parallel, perpendicular, or neither, find the angle between them.

(a) $x + 4y - 3z = 1,\ -3x + 6y + 7z = 0$

$\langle 1, 4, -3 \rangle \langle -3, 6, 7 \rangle$ perpendicular

$-3 + 24 - 21$

(b) $9x - 3y + 6z = 2,\ 2y = 6x + 4z$

$\langle 3, -1, 2 \rangle \langle 3, -1, 2 \rangle$ parallel

(c) $x + 2y - z = 2,\ 2x - 2y + z = 1$

$\langle 1, 2, -1 \rangle \langle 2, -2, 1 \rangle$ neither

$2 - 4 - 1$

10. (a) Find the distance from the point $(-2, 2, 1)$ to the plane $3x - 5y + z = 5$.

$\frac{|-6-10+1-5|}{\sqrt{9+25+1}} = \frac{20}{\sqrt{35}}$

$\frac{20}{\sqrt{35}}$

(b) Find the distance between the parallel planes $2x - 3y + z = 4$ and $4x - 6y + 2z = 3$.

$(2, 0, 0)$ distance

$\frac{|8 - 3|}{\sqrt{16+36+4}} = \frac{5}{\sqrt{56}}$

$\frac{5}{\sqrt{56}}$