Lyell C Read CH 12.1 Homework 10/14/2018

pr. 11-37 = x | x%2 != 0

11) $P_0 = (0, 2, -2)$ (x_0 y_0 z_0) $\vec{n} = \langle 1, 1, -1 \rangle$ (a, b, c) $P = (x, y, z)$

$ax + by + cz = ax_0 + by_0 + cz_0 =$ **$x + y - z = 2 + 2 = 4$**

13) $P_0 = (2, 3, 0)$ $\vec{n} = \langle -1, 2, -3 \rangle$ $P = (x, y, z)$

$ax + by + cz = ax_0 + by_0 + cz_0 =$ **$-x + 2y - 3z = -2 + 6 = 4$**

15) $v_1 = \langle 1, 0, 1 \rangle$ $v_2 = \langle 0, 2, 1 \rangle$ $P_0 = \langle 1, 2, 3 \rangle$

$$v_1 \times v_2 = \vec{n} = \begin{vmatrix} i & -j & k \\ 1 & 0 & 1 \\ 0 & 2 & 1 \end{vmatrix} = i\begin{vmatrix} 0 & 1 \\ 2 & 1 \end{vmatrix} - j\begin{vmatrix} 1 & 1 \\ 0 & 1 \end{vmatrix} + k\begin{vmatrix} 1 & 0 \\ 0 & 2 \end{vmatrix} = \langle -2, -1, 2 \rangle$$

$(0 - 2)$ $-(1 - 0)$ $(2 - 0)$

$ax + by + cz = ax_0 + by_0 + cz_0 =$ **$-2x - y + 2z = -2 - 2 + 6 = 2$**

17) points $P(1, 0, 3)$, $Q(0, 4, 2)$, $X(1, 1, 1)$

$\vec{PQ} = \langle -1, 4, -1 \rangle$

$\vec{PX} = \langle 0, 1, -2 \rangle$

$\vec{PQ} \times \vec{PX} = \vec{n}$ $P_0 = P = (1, 0, 3)$

$$\vec{PQ} \times \vec{PX} = \begin{vmatrix} i & -j & k \\ -1 & 4 & -1 \\ 0 & 1 & -2 \end{vmatrix} = i\begin{vmatrix} 4 & -1 \\ 1 & -2 \end{vmatrix} - j\begin{vmatrix} -1 & -1 \\ 0 & -2 \end{vmatrix} + k\begin{vmatrix} -1 & 4 \\ 0 & 1 \end{vmatrix} = \langle -7, -2, -1 \rangle = \vec{n}$$

$(-8 + 1) = -7$ $-(2 - 1) = -2$ $-1 - 4 = -5$

$ax + by + cz = ax_0 + by_0 + cz_0 =$ **$-7x - 2y - z = -7 - 3 = -10$**

19) (skip, same as 17))

23) (skip b/c same as #21))

21) $3x - 2y + z = 6$

x axis int $y = 0, z = 0$ $3x = 6$ **$x = 2$**

y axis int $z = 0, x = 0$ $-2y = 6$ **$y = -3$**

z axis int $x = 0, y = 0$ $z = 6$ **$z = 6$**

xy, $z = 0$: **$3x - 2y = 6$**

xz, $y = 0$: **$3x + z = 6$**

yz, $x = 0$: **$-2y + z = 6$**

25) $x+y+4z=10$ $\quad -x-3y+z=10$ $\quad$ If $n_1 \cdot n_2 = 0$

$\vec{n_1} = \langle 1,1,4 \rangle$ → not factors thus not $\parallel$ $\vec{n_2} = \langle -1,-3,1 \rangle$ $\quad \therefore \perp$

$\langle 1,1,4 \rangle \cdot \langle -1,-3,1 \rangle = -1-3+4 = 0$ **They are $\perp$**

27) $3x+2y-3z=10$ $\quad -6x-10y+z=10$

$n_1 = \langle 3,2,-3 \rangle$ → not factors thus not $\parallel$ $n_2 = \langle -6,-10,1 \rangle$

$\langle 3,2,-3 \rangle \cdot \langle -6,-10,1 \rangle = -18-20-3 \neq 0$ **Neither**

29) (SKIP: Same idea as 25, 27)

31) $Q: -x+2y-4z=1$ $\quad P_0=(1,0,4)$ $\quad \vec{n}=(-1,2,-4)$

$n' = (-2,4,-8)$ $\quad P_0' = (1,0,4)$ $\quad Q' = -2x+4y-8z = -2-32$ OWZ

$Q' = -x+2y-4z = -17$

33) same as 31 $\quad$ 35) $Q: -x+2y+z=1 \quad R: x+y+z=0$

$z=0$ $\quad -x+2y=1$ $\quad x+y=0$ → $x=1$, $y=1$ → $(1,1,0)=P_0$

$\vec{n_Q} = \langle -1,2,1 \rangle$ $\quad \vec{n_R} = \langle 1,1,1 \rangle$ $\quad n_Q \times n_R =$ (below)

$$n_Q \times n_R = \begin{vmatrix} i & -j & k \\ -1 & 2 & 1 \\ 1 & 1 & 1 \end{vmatrix} = i\begin{vmatrix} 2 & 1 \\ 1 & 1 \end{vmatrix} - j\begin{vmatrix} -1 & 1 \\ 1 & 1 \end{vmatrix} + k\begin{vmatrix} -1 & 2 \\ 1 & 1 \end{vmatrix} = \langle 1,2,-3 \rangle$$

$2-1 = 1$ $\quad -(-1-1) = 2$ $\quad -1-2 = -3$

$r(t) = (1,1,0) + t\langle 1,2,-3 \rangle = \boxed{\langle 1+t, 1+2t, -3t \rangle}$

37) [follow procedure from 35]