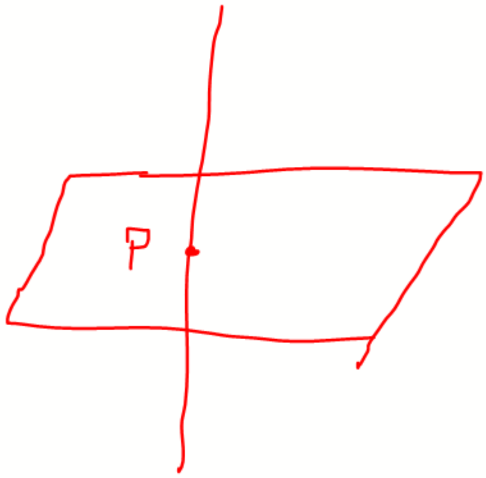
Which of the following is the point of intersection of the plane $5x-2y-3z=0$ and the line $\left\{ \begin{array}{l} x=3+2t \\ y=1+3t \\ z=2-t \end{array} \right\}$?



(a) $P(4, 7, 2)$

(b) $P(1, -2, 3)$

(c) $P(2, -1, 4)$

(d) $P(3, 9, -1)$

(e) $P(0,0, 0)$

$5(3+2t)-2(1+3t)-3(2-t)=0$

$10t-6t+3t+15-2-6=0$

$7t=-7 \Rightarrow t=-1$

$P(1,-2,3)$

Which of the following is the intersection point of the plane $5x-2y-3z=0$ and the line $\left\{\begin{array}{c} x=4+2t \\ y=2+3t \\ z=3-t \end{array}\right\}$?

(a) $P(4, 7, 2)$

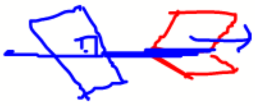
(b) $P(1, -2, 3)$

(c) $P(2, -1, 4)$

(d) $P(3, 9, -1)$

(e) $P(0,0, 0)$

Which of the following is the equation of the plane that is passing through the point $\boxed{P(2, 2, -2)}$ and $\boxed{\text{vertical}}$ to the line of intersection of the planes $x - 2y + 2z = 3$ and $x + y + z = 2$?



$\vec{v} = \boxed{\vec{n}_1 \times \vec{n}_2}$

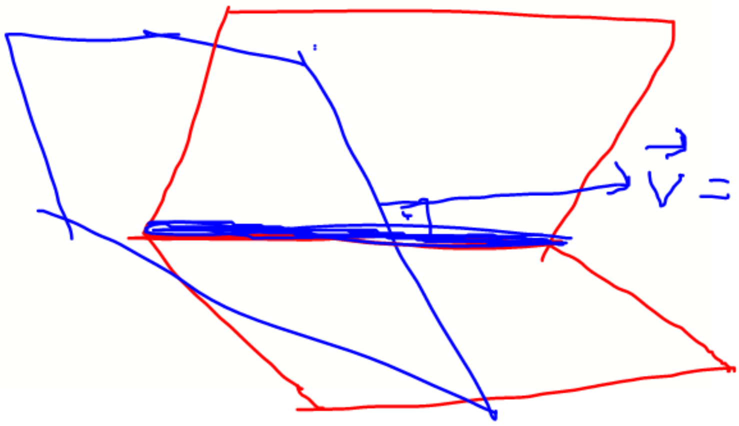
(a) $-5x + 2y + 3z = -12$

(b) $-4x + y + 3z = -12$

(c) $-5x + 2y + 3z = -10$

(d) $-4x - 2y + 3z = -18$

(e) $-4x + y + 3z = -10$



$\vec{v} = \vec{n}$

$\vec{n}_1 = \langle 1, -2, 2 \rangle$

$\vec{n}_2 = \langle 1, 1, 1 \rangle$

$$\vec{v} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & -2 & 2 \\ 1 & 1 & 1 \end{vmatrix} = \underbrace{\langle -4, 1, 3 \rangle}_{\text{is ortho. to our plane}}$$

so we can take $\vec{v}$ as $\vec{n}$.

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

$$-4x + y + 3z = -12$$

$8 - 2 + 6$

Which of the following is the equation of the plane that is passing through the point $P(2, 2, -2)$ and vertical to the line of intersection of the planes $x - 2y + 3z = 3$ and $x + y + z = 2$?

(a) $-5x + 2y + 3z = -12$

(b) $-4x + y + 3z = -12$

(c) $-5x + 2y + 3z = -10$

(d) $-4x - 2y + 3z = -18$

(e) $-4x + y + 3z = -10$

Which of the following is the equation of tangent line of the curve that is given by parametric equations $x = 3\cos t + \sin t$, $y = e^{2t}$ at the point $(3,1)$?

(a) $y = x - 2$

(b) $y = 2x - 5$

(c) $y = \dfrac{x-1}{2}$

(d) $y = \dfrac{2x-3}{3}$

(e) $y = 3x - 8$

Which of the following is the equation of tangent line of the curve that is given by parametric equations $x = e^{2t}$, $y = 2\cos t + 6\sin t$ at the point $(1,2)$?

(a) $y = \dfrac{x+5}{3}$

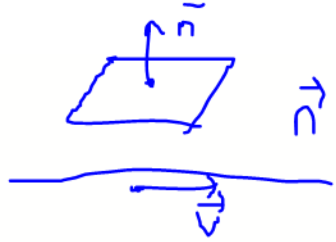
(b) $y = \dfrac{x+11}{6}$

(c) $y = 3x - 1$

(d) $y = 4x - 2$

(e) $y = 6x - 4$

Determine the correctness of the statements given below.

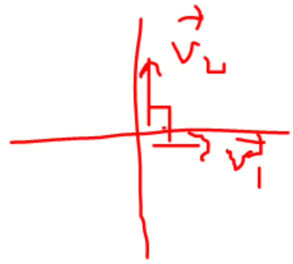


$\vec{n} \cdot \vec{v} = 0$

F I: The plane $2x - y + 3z = 4$ and the line $\begin{Bmatrix} x = 1 + 4t \\ y = 2 - 2t \\ z = 3 + 6t \end{Bmatrix}$ are parallel

$2 \cdot 4 - 1(-2) + 3 \cdot 6 = 8 + 2 + 18 \neq 0$

T II: The lines $\begin{Bmatrix} x = 2 + 2t \\ y = 3 - t \\ z = 1 + 3t \end{Bmatrix}$ and $\begin{Bmatrix} x = 1 + 4t \\ y = 2 + 5t \\ z = 5 - t \end{Bmatrix}$ are orthogonal

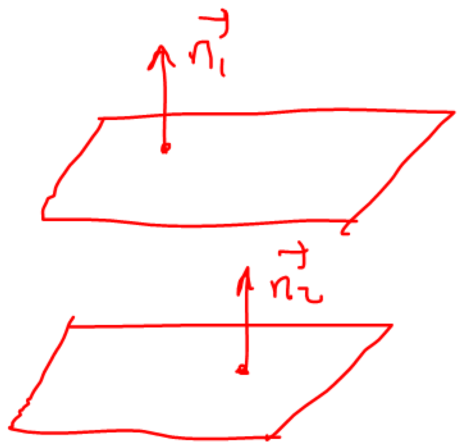


$\vec{v}_1 \cdot \vec{v}_2 = 0$ $\quad 2 \cdot 4 + (-1) \cdot 5 + 3(-1) = 8 - 5 - 3 = 0$

T III: The planes $x + 2y = 5 - z$ and $2z + 2x = 1 - 4y$ are parallel

(a)	(b)	(c)	(d)	(e)
~~I - True~~	I - False	~~I - True~~	~~I - True~~	I - False
~~II - True~~	II - True	~~II - True~~	~~II - False~~	II - True
~~III - True~~	III - True	~~III - False~~	~~III - True~~	III - False

$\left.\begin{array}{l} \vec{n}_1 = \langle 1, 2, 1 \rangle \\ \vec{n}_2 = \langle 2, 4, 2 \rangle \end{array}\right\} \vec{n}_1 \parallel \vec{n}_2$



$\vec{n}_1 \parallel \vec{n}_2$

Determine the correctness of the statements given below.

I: The planes $2x+3y-4z=2$ and $x+2y+2z=3$ are orthogonal

II: The lines $\left\{\begin{array}{l} x=1+t \\ y=4-t \\ z=3+t \end{array}\right\}$ and $\left\{\begin{array}{l} x=1+2t \\ y=3-2t \\ z=2+2t \end{array}\right\}$ are parallel

III: The plane $x+2y+2z=1$ and the line $\left\{\begin{array}{l} x=1+4t \\ y=2+t \\ z=3-3t \end{array}\right\}$ are orthogonal

(a)	(b)	(c)	(d)	(e)
I - True	I - False	I - True	I - True	I - False
II - True	II - True	II - True	II - False	II - True
III - True	III - True	III - False	III - True	III - False