

Quiz 2

Key

This is a two-stage quiz. During the first stage, use your knowledge & calculator. You have 15 min. In the second stage, you are now welcome to use your books, notes, and students in the class to retake the same quiz. You have the remainder of the quiz time to write one solution (with everyone's name on it!!!) to be turned in for the group.

1. Consider the line l defined by $\langle 3 + 4t, -3t, -1 + t \rangle$ where $t \in \mathbb{R}$.

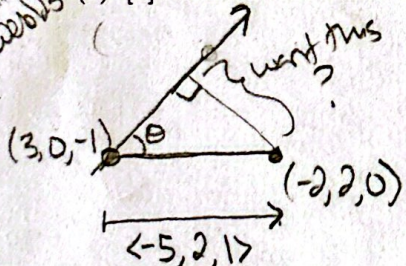
- (a) [2] Label the positive x , y , and z axis, plot one point on l , and then sketch the line.

$t=0 \Rightarrow \langle 3, 0, -1 \rangle$ $t=-1 \Rightarrow \langle -1, 3, -2 \rangle$

- (b) [2] Find an equation of plane that is perpendicular to l and passed through $(-2, 2, 0)$.

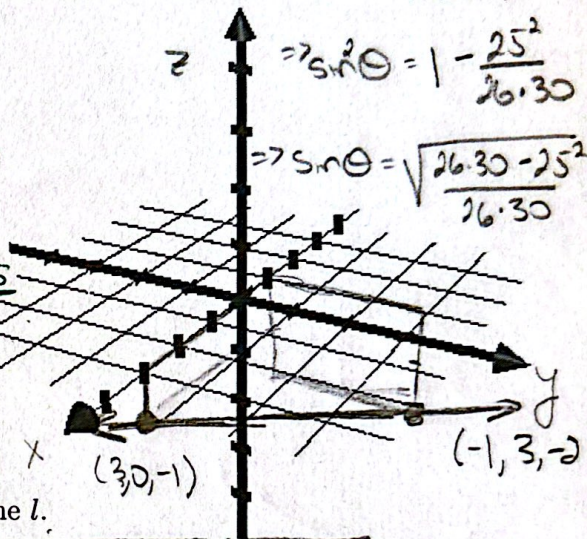
\Rightarrow direction vector of l is \vec{r}
 $\Rightarrow \vec{r} = \langle 4, -3, 1 \rangle$ thru $(-2, 2, 0)$
 $\Rightarrow \langle 4, -3, 1 \rangle \cdot \langle x, y, z \rangle - \langle -2, 2, 0 \rangle = 0$

- (c) [3] Find the distance between $(-2, 2, 0)$ and the line l .



$\langle 4, -3, 1 \rangle \cdot \langle -5, 2, 1 \rangle = \sqrt{16+9+1} \sqrt{25+4+1} \cos \theta$
 $-20 - 6 + 1 = \sqrt{26} \sqrt{30} \cos \theta$
 $\frac{-25}{\sqrt{26} \sqrt{30}} = \cos \theta \Rightarrow \theta = \arccos\left(\frac{-25}{\sqrt{26} \sqrt{30}}\right) \approx$

(alt) $\sin^2 \theta + \cos^2 \theta = 1$
 $\sin^2 \theta + \left(\frac{-25}{\sqrt{26} \sqrt{30}}\right)^2 = 1$
 $\Rightarrow \sin^2 \theta = 1 - \frac{25^2}{26 \cdot 30}$
 $\Rightarrow \sin \theta = \sqrt{\frac{26 \cdot 30 - 25^2}{26 \cdot 30}}$



(+1) { Solution

2. Let \vec{u} , \vec{v} , and \vec{w} be the vectors shown on the right. Assume \vec{u} is a unit vector and that $\|\vec{v}\| = \sqrt{3}$.

- (a) [2] Find $\vec{u} \times \vec{v}$

$\|\vec{u}\| \cdot \|\vec{v}\| \cdot \sin \theta = 1 \cdot \sqrt{3} \cdot \sin 90^\circ = \sqrt{3}$

So $\frac{1}{\sqrt{3}}$ out of the page

- (b) [1] Find $\vec{v} \times \vec{u} = -(\vec{u} \times \vec{v})$

so $\sqrt{3}$ into the page

