Quiz 3 Math 2202

Guidelines

- This quiz is for you to test yourself on what we've been studying recently.
- You have 10 minutes. As a section, we will go over the quiz (or part of it). Solutions will be posted online as well.

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1. Write the equation for the following planes in linear equation form. Are any of these planes are parallel? Are any perpendicular to each other?

   (a) xy-plane

   (b) zy-plane

   (c) $y = 5$

   (d) $y = \frac{3}{5}x - 2z + 1$

2. Find the equation of a plane parallel to the plane $y = \frac{3}{5}x - 2z + 1$ and containing the point $(0, 3, 4)$. Is the vector $\langle 0, 3, 4 \rangle$ parallel to this plane?

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3. Let $\mathbf{a}$, $\mathbf{b}$ and $\mathbf{c}$ be non-zero vectors. Which of the following is a meaningful quantity? If so, is it a scalar or a vector?

   (a) $|\mathbf{a} \times \mathbf{b}|$

   (b) $|\mathbf{a}| \times |\mathbf{b}|$

   (c) $|\mathbf{a} \cdot \mathbf{b}|$

   (d) $|\frac{\mathbf{a} \cdot \mathbf{b}}{|\mathbf{b}|}|$

   (e) $\frac{|\mathbf{a} \times \mathbf{b}|}{|\mathbf{b}|}$

   (f) $(\mathbf{a} \cdot \mathbf{b}) \times \mathbf{c}$

   (g) $(\mathbf{a} \times \mathbf{b}) \cdot \mathbf{c}$

   For those that are meaningful quantities, what do they measure? Sketch a picture of vectors $\mathbf{a}$, $\mathbf{b}$ and $\mathbf{c}$ to illustrate, when appropriate.

Think about it... Find the distance from the point $Q = (2, -3, 1)$ to the line $L : x = 3 - t, y = 1 + 4t, z = 6$. (By 'distance', remember we mean the shortest distance between Q and any point on L.) Can you find the coordinates of the point on L which is closest to Q?