

Math 173 - Quiz 3

February 11, 2010

Name key

Score _____

Show each step to receive full credit. Supply explanations when necessary.

1. (2 points) Find a set of parametric equations for the line passing through $(2, 1, -3)$ and parallel to the line with the following symmetric equations.

$$\frac{x-4}{3} = y-2 = \frac{z+6}{8}$$

$$\vec{v} = 3\hat{i} + \hat{j} + 8\hat{k}$$

POINT $(2, 1, -3)$

$$\begin{aligned} x &= 2 + 3t \\ y &= 1 + t \\ z &= -3 + 8t \end{aligned}$$

2. (3 points) Find the distance from the point $(2, -2, 3)$ to the plane described by the equation $2x - 3y + 8z = 6$.

P $(3, 0, 0)$ $\vec{PQ} = -\hat{i} - 2\hat{j} + 3\hat{k}$

Q $(2, -2, 3)$ $\vec{N} = 2\hat{i} - 3\hat{j} + 8\hat{k}$

DISTANCE = $|\text{proj}_{\vec{N}} \vec{PQ}|$

$$= \frac{|\vec{PQ} \cdot \vec{N}|}{|\vec{N}|} = \frac{|-2 + 6 + 24|}{\sqrt{4 + 9 + 64}} = \frac{28}{\sqrt{77}}$$

3. (2 points) Find a point on the line of intersection of the planes $2x - y + 3z = 8$ and $x + y + z = 2$.

CHOOSE $y = 0$

$$2x + 3z = 8$$

$$x + z = 2$$

\Rightarrow

$$2x + 3z = 8$$

$$-2x - 2z = -4$$

$$\underline{\hspace{2cm}} \quad z = 4 \Rightarrow x = -2$$

$(-2, 0, 4)$

4. (3 points) Find an equation for the plane determined by the points $(1, 2, 4)$, $(-1, 2, -4)$, and $(-2, 5, 3)$.

P $(1, 2, 4)$ $\vec{PQ} = -2\hat{i} - 8\hat{k}$

Q $(-1, 2, -4)$ $\vec{PR} = -3\hat{i} + 3\hat{j} - \hat{k}$

R $(-2, 5, 3)$

$$\vec{N} = \vec{PQ} \times \vec{PR} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ -2 & 0 & -8 \\ -3 & 3 & -1 \end{vmatrix}$$

$$= 24\hat{i} + 22\hat{j} - 6\hat{k}$$

ALL USE

$$\vec{N} = 12\hat{i} + 11\hat{j} - 3\hat{k}$$

POINT P $(1, 2, 4)$

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$$12(x-1) + 11(y-2) - 3(z-4) = 0$$

$$12x + 11y - 3z = 22$$