

**Math 173 - Quiz 3**

February 13, 2014

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.

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

DIRECTION:  $3\hat{i} + \hat{j} + 8\hat{k}$ Line through  $(2, 1, -3)$  is

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

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

$$\text{Distance} = \frac{|2(2) - 3(-2) + 8(3) - 6|}{\sqrt{2^2 + (-3)^2 + 8^2}} = \frac{28}{\sqrt{77}} \approx 3.19$$

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

Let  $x = 0$ . Then

$$-y + 3z = 8$$

$$\begin{aligned} y + z &= 2 \\ \hline 4z &= 10 \end{aligned}$$

$$z = 2.5$$

$$\Rightarrow y = -0.5$$

$$(0, -0.5, 2.5)$$

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

P Q R

$$\vec{PQ} = -2\hat{i} - 8\hat{k}$$

$$\vec{PR} = -3\hat{i} + 3\hat{j} - \hat{k}$$

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

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

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

Instead, I'll use  $12\hat{i} + 11\hat{j} - 3\hat{k}$ 

$$\text{Plane is } 12(x-1) + 11(y-2) - 3(z-4) = 0$$

or

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