

MATH 280 - QUIZ #2

Name: KEY

**Directions:** Please show all work for maximum credit. This quiz is worth 14 points. Good luck!

(3 points) 1. Find the equation of the line that passes through the points  $P(4, 2, -1)$  and  $Q(6, -3, 2)$

$$\vec{PQ} = \langle 2, -5, 3 \rangle$$

$$x = 4 + 2t$$

$$y = 2 - 5t$$

$$z = -1 + 3t$$

(3 points) 2. Find the equation of the plane that contains the points  $P(2, 3, -1)$ ,  $Q(-1, 4, 1)$  and  $R(4, -1, 5)$ .

$$\vec{PQ} = \langle -3, 1, 2 \rangle$$

$$\vec{PR} = \langle 2, -4, 6 \rangle$$

$$\vec{PQ} \times \vec{PR} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ -3 & 1 & 2 \\ 2 & -4 & 6 \end{vmatrix} = \hat{i}(6+8) - \hat{j}(-18-4) + \hat{k}(12-2)$$

$$= 14\hat{i} + 22\hat{j} + 10\hat{k}$$

$$14(x-2) + 22(y-3) + 10(z+1) = 0$$

$$14x - 28 + 22y - 66 + 10z + 10 = 0$$

$$14x + 22y + 10z - 84 = 0$$

$$7x + 11y + 5z = 42$$

3. Given the following vector function:  $\vec{r}(t) = (4 \sin 2t)\hat{i} + (4 \cos 2t)\hat{j} + 6t\hat{k}$ . Find the following.

(3 points) a.  $\vec{r}'(t)$   $\vec{r}'(t) = (8 \cos 2t)\hat{i} + (-8 \sin 2t)\hat{j} + 6\hat{k}$

(3 points) b.  $\int \vec{r}(t) dt$   $\int \vec{r}(t) dt = (-2 \cos 2t)\hat{i} + (2 \sin 2t)\hat{j} + 3t^2\hat{k} + \vec{C}$

(3 points) c.  $\int_0^{\pi/4} \vec{r}(t) dt$   $\int_0^{\pi/4} \vec{r}(t) dt = \left[ (-2 \cos 2t)\hat{i} + (2 \sin 2t)\hat{j} + 3t^2\hat{k} \right] \Big|_0^{\pi/4}$

$$= \left[ (-2 \cos 2(\frac{\pi}{4}))\hat{i} + (2 \sin 2(\frac{\pi}{4}))\hat{j} + 3(\frac{\pi}{4})^2\hat{k} \right] - \left[ (-2 \cos 0)\hat{i} + (2 \sin 0)\hat{j} + 0\hat{k} \right]$$

$$= \left[ 0\hat{i} + 2\hat{j} + \frac{3\pi^2}{16}\hat{k} \right] - \left[ -2\hat{i} + 0\hat{j} + 0\hat{k} \right]$$

$$= 2\hat{i} + 2\hat{j} + \frac{3\pi^2}{16}\hat{k}$$