

## "QUIZ" for Lecture 3

E-MAILSCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q3FirstLast.pdf) ASAP BUT NO LATER THAN Sept. 15, 8:00pm

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1. Find an equation of the plane that passes through the points  $(0, 1, 1)$ ,  $(1, 0, 1)$ ,  $(1, 1, 0)$ .

$$P = (0, 1, 1)$$

$$Q = (1, 0, 1)$$

$$R = (1, 1, 0)$$

$$PQ = \langle 1-0, 0-1, 1-1 \rangle = \langle 1, -1, 0 \rangle$$

$$PR = \langle 1-0, 1-1, 0-1 \rangle = \langle 1, 0, -1 \rangle$$

$$PQ \times PR = \langle 1, -1, 0 \rangle \times \langle 1, 0, -1 \rangle$$

$$\begin{vmatrix} i & j & k \\ 1 & -1 & 0 \\ 1 & 0 & -1 \end{vmatrix} = i \begin{vmatrix} -1 & 0 \\ 0 & -1 \end{vmatrix} - j \begin{vmatrix} 1 & 0 \\ 1 & -1 \end{vmatrix} + k \begin{vmatrix} 1 & -1 \\ 1 & 0 \end{vmatrix}$$

$$= i + j + k = \langle 1, 1, 1 \rangle$$

$$n = \langle 1, 1, 1 \rangle$$

Reference point:  $P (0, 1, 1)$

$$a(x-x_0) + b(y-y_0) + c(z-z_0) = 0$$

$$1 \cdot (x-0) + 1 \cdot (y-1) + 1 \cdot (z-1) = 0$$

$$x + y + z = 2$$

∴ An equation for the plane passing through  $P, Q$ , and  $R$  is  $x + y + z = 2$ .

2. Find the intersection of the line

$$r(t) = \langle 1, 1, 0 \rangle + t\langle 0, 2, 4 \rangle$$

and the plane

$$r(t) = \langle 1, 1, 0 \rangle + \langle 0, 2t, 4t \rangle$$

$$r(t) = \langle 1, 1+2t, 4t \rangle$$

$$x + y + z = 14$$

$$\langle 1, 1, 1 \rangle$$

$$\langle x, y, z \rangle$$

$$1 + (1+2t) + (4t) = 14$$

$$2 + 6t = 14$$

$$6t = 12$$

$$t = 2$$

$$x(2) = 1$$

$$y(2) = 5$$

$$z(2) = 8$$

∴ The point of intersection of this line and plane is  $(1, 5, 8)$ .