The cross product of any two of these vectors gives a normal to the plane.

Math 162A - Quiz #4 – Au08 (OSU)
November 13, 2008

Name:
Signature:
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Instructions. The point value of each problem is indicated in square brackets. To obtain full credit, you must have the correct answers along with relevant supporting work to justify them. Partial credit will be given based on the work that is shown. However, ***answers without supporting work will receive no credit.***

Problem 1. Find an equation of the plane that contains the points $\underbrace{(0,1,1)}_{P}$, $\underbrace{(1,0,1)}_{Q}$, and $\underbrace{(1,1,0)}_{R}$. Simplify your answer to the form $ax+by+cz=d$. [8pts]

$$\overrightarrow{PQ} = \langle 1,0,1\rangle - \langle 0,1,1\rangle = \langle 1,-1,0\rangle$$
$$\overrightarrow{PR} = \langle 1,1,0\rangle - \langle 0,1,1\rangle = \langle 1,0,-1\rangle$$
$$\overrightarrow{QR} = \langle 1,1,0\rangle - \langle 1,0,1\rangle = \langle 0,1,-1\rangle$$

$$\overrightarrow{PQ} \times \overrightarrow{PR} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & -1 & 0 \\ 1 & 0 & -1 \end{vmatrix} = \vec{i}\begin{vmatrix} -1 & 0 \\ 0 & -1 \end{vmatrix} - \vec{j}\begin{vmatrix} 1 & 0 \\ 1 & -1 \end{vmatrix} + \vec{k}\begin{vmatrix} 1 & -1 \\ 1 & 0 \end{vmatrix} = \langle 1,1,1\rangle$$

Likewise $\overrightarrow{PQ} \times \overrightarrow{QR} = \langle 1,1,1\rangle$
$\overrightarrow{PR} \times \overrightarrow{QR} = \langle 1,1,1\rangle$

A vector eqn for the plane is
$$\langle x-0, y-1, z-1\rangle \cdot \langle 1,1,1\rangle = 0$$
the coordinates of P (the coordinates of Q or R will also do).

Hence $x+y-1+z-1=0$

or $x+y+z=2$

Problem 2. Find the interval of convergence of the series $\Sigma_{n=1}^{\infty} n^n x^n$. [10pts (*This will be scaled.)]

[Refer to the solution of first midterm!]