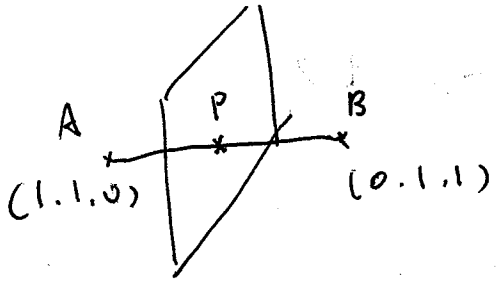
Math 251 Quiz 2 Instructor: Sheng-Chi Liu

Name: Solution
UIN: _____

Show all your work! Credit will not be given without work.

1) (5 points) Find an equation for the plane consisting of all points that are equidistant from the points $(1, 1, 0)$ and $(0, 1, 1)$.



$P\left(\frac{1+0}{2}, \frac{1+1}{2}, \frac{0+1}{2}\right)$

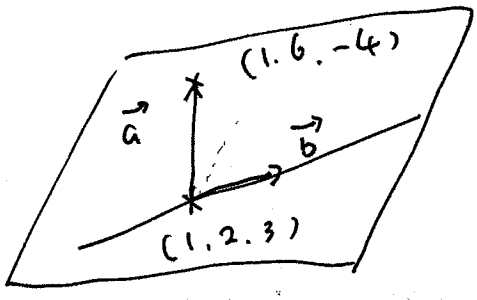
$\Rightarrow P\left(\frac{1}{2}, 1, \frac{1}{2}\right)$

$\overrightarrow{AB} = \langle -1, 0, 1 \rangle$

Plane: $-1 \cdot (x - \frac{1}{2}) + 0 \cdot (y - 1) + 1 \cdot (z - \frac{1}{2}) = 0$

$\Rightarrow \boxed{-(x - \frac{1}{2}) + (z - \frac{1}{2}) = 0}$

2) (5 points) Find an equation of the plane that passes through the point $(1, 6, -4)$ and contains the line $x = 1 + 2t,\ y = 2 - 3t,\ z = 3 - t$.



$\vec{a} = (1, 6, -4) - (1, 2, 3)$

$= \langle 0, 4, -7 \rangle$

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

$$\vec{n} = \vec{a} \times \vec{b} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 0 & 4 & -7 \\ 2 & -3 & -1 \end{vmatrix}$$

$= -25\vec{i} - 14\vec{j} - 8\vec{k}$

$$-25(x-1) - 14(y-2) - 8(z-3) = 0$$