Name: ANSWERS Lehman ID: _____

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MAT 226 (Fall 2019)
Quiz 1

1. **(7 pts)** Write the equation of the plane in $\mathbb{R}^3$ that contains the origin and the line

$$\vec{r}(t) = (2t+1, t, 3t-2)$$

Need normal vector $\vec{n}$.

Two vectors in the plane are $\vec{r}(0) = (1, 0, -2)$ and $\vec{r}(1) = (3, 1, 1)$

Thus, $\vec{n} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 0 & -2 \\ 3 & 1 & 1 \end{vmatrix} = (2, -7, 1)$

Since the origin belongs to this plane, its eqn is:

$$\boxed{2x - 7y + z = 0}$$

2. **(3 pts)** Write the equation of the plane $x + y = 0$ in *cylindrical coordinates*. Recall that cylindrical coordinates are given by $(x, y, z) = (r\cos\theta, r\sin\theta, z)$.

$x + y = 0 \rightsquigarrow r\cos\theta + r\sin\theta = 0$

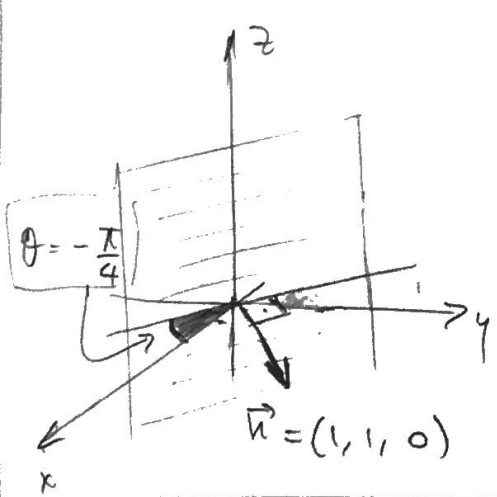
$\Rightarrow r(\cos\theta + \sin\theta) = 0$

$r \neq 0$: $\cos\theta + \sin\theta = 0$

$\cos\theta \neq 0$: $1 + \tan\theta = 0$

$\Rightarrow \tan\theta = -1$

$\Rightarrow \boxed{\theta = -\frac{\pi}{4}}$



The equation of the plane is:

$\theta = -\frac{\pi}{4}$, variables r, z are free