Assignment No. 3 **MATHEMATICS 2050** Fall 2004

Due as follows:

Dr. Kondratieva	Tuesday October 5	in class or assignment box
Dr. Goodaire	Wednesday October 6	10:00 a.m.
Dr. Yuan	Wednesday October 6	in class

[2] 1. Find the equation of the plane parallel to the plane with equation $18x + 6y - 5z = 0$ and passing through the point $(-1, 1, 7)$.

[2] 2. Find the equation of the plane passing through $A(-1, 2, 1)$, $B(0, 1, 1)$, and $C(7, -3, 0)$.

[3] 3. Show that the lines with vector equations

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -1 \\ 4 \\ 4 \end{bmatrix} + t \begin{bmatrix} -1 \\ 5 \\ 2 \end{bmatrix} \quad \text{and} \quad \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ -6 \\ 0 \end{bmatrix} + t \begin{bmatrix} 2 \\ -10 \\ -4 \end{bmatrix}$$

are the same.

4. Let ℓ be the line with vector equation $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ -3 \\ -4 \end{bmatrix} + t \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ and let π be the plane with equation $3x - 4y + z = 18$.

[1] (a) Give an easy reason why ℓ and π must intersect.

[2] (b) Find the point of intersection of ℓ and π.

[2] 5. Let $\mathsf{u} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ and $\mathsf{v} = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}$. Find the projection of u on v and the projection of v on u.

[3] 6. Let P be the point $(-1, 2, 1)$ and ℓ the line with equation $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} + t \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$. Find the distance from P to ℓ.

[15]