MATH 1210 Assignment #3

Due: October 29 2008, In Class

Reminder: all assignments *must* be accompanied by an honesty declaration. This should be stapled to the FRONT of your assignment. Include your lab section.
Show all your work. Unjustified answers will receive little or no credit. Use single sided white $8\frac{1}{2} \times 11\frac{1}{2}$ paper, staple the top left corner.

1. Given points $P_1(-4, 7, 10)$, $P_2(4, 9, 4)$, and $P_3(-1, 3, 7)$, show that $P_1P_2P_3$ is a right angle triangle in two ways:
   (a) Show that $||\overrightarrow{P_1P_2}||^2 = ||\overrightarrow{P_1P_3}||^2 + ||\overrightarrow{P_3P_2}||^2$.
   (b) Find the angle between the vectors $\overrightarrow{P_3P_2}$ and $\overrightarrow{P_3P_1}$.

2. Find the standard form of the equation of the plane that passes through the points $P_1(1, 3, -2)$, $P_2(4, 6, -1)$, and $P_3(5, 2, 4)$.

3. Find the intersection (if it exists) of the lines L_1 and L_2. (If the intersection does not exist, explain why not.)
   (a) $L_1 : [1, 2, -3] + t[3, 4, 2]$
   $L_2 : [3, 2, 7] + s[1, 5, -2]$
   (b) $L_1 : [1, 3, -2] + t[-1, 3, 6]$
   $L_2 : [4, 1, 3] + s[5, -8, -7]$

4. Find (if it exists), the point of intersection of the line $L : [3, 1, -3] + t[-1, 1, 2]$ and the plane $3x - 2y + z = 10$. (If the intersection does not exist, explain why not.)

5. Let $A = \begin{pmatrix} 3 & -2 \\ 2 & -1 \end{pmatrix}$, $B = \begin{pmatrix} 0 & -2 & -1 \\ 1 & 2 & 4 \\ -1 & 3 & 2 \end{pmatrix}$, $C = \begin{pmatrix} 2 & -1 & 3 \\ 1 & 3 & -1 \end{pmatrix}$, $D = \begin{pmatrix} 1 & 2 \\ 0 & 1 \\ -2 & -1 \end{pmatrix}$, $E = \begin{pmatrix} 3 & -2 & 1 \end{pmatrix}$ and $F = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$.

   Evaluate the following if possible. If it is not possible, explain why not.
   (a) $2A + (CD)^T$
   (b) $FE + D^T$
   (c) $BD + 3A$
   (d) $CE^T - 2F$
   (e) $DAC + B$
   (f) $EB - 3F^T$