MATH 2203 – Quiz 2
September 7, 2005

NAME_______________________________________________

Find an equation for the plane that contains both the point $P(-3, 6, -1)$
and the line with symmetric equations

$$\frac{x - 4}{2} = \frac{y - 4}{1}, \quad z = 2.$$ 

As is always the rule on exams and tests, you must present a detailed solution.

**Solution:** The given line contains the point $P_0(4, 4, 2)$ and is parallel to
the vector $v = \langle 2, 1, 0 \rangle$. This means that the vector $\overrightarrow{P_0P} \times v$ is orthogonal to
the plane in question (so this is a normal vector for the plane in question).

Now we do the computation:

$$\mathbf{n} = \overrightarrow{P_0P} \times \mathbf{v} = \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ -7 & 2 & -3 \\ 2 & 1 & 0 \end{vmatrix} = 3 \mathbf{i} - 6 \mathbf{j} - 11 \mathbf{k}$$

and we see that the plane in question has equation

$$3(x + 3) - 6(y - 6) - 11(z + 1) = 0$$

or

$$3x - 6y - 11z + 34 = 0.$$