MATH 133: Vectors, Matrices and Geometry

Written Assignment 4

Due in tutorial or by Friday 1pm the week of October 13, 2003

Write the name of your tutor and your tutorial section number

in the top right corner of the first page.

Justify all of your assertions.

Problem.

(a) If the planes $a_1x + b_1y + c_1z = d_1$ and $a_2x + b_2y + c_2z = d_2$ intersect in a line L, show that any plane containing L is of the form

$$A(a_1x + b_1y + c_1z) + B(a_2x + b_2y + c_2z) = Ad_1 + Bd_2$$

for suitable scalars A, B. Use this to find the equation of the plane passing through point $(1, 2, 3)$ and containing the line of intersection of the planes $2x + 3y - 4z = 1$, $3x - 2y + 4z = 1$.

(b) Using the theory of linear equations, show that three planes in $\mathbb{R}^3$ which do not intersect in a point have coplanar normal vectors.