MATH 1300 ASSIGNMENT PROBLEMS (UNIT 2)

1. A plane has the normal vector (1, 4, 2) and passes through the point P = (2, 1, 3)

[2] (a) Find the point-normal form equation of this plane.

[3] (b) Find the standard form equation of this plane.

[10] 2. A plane passes through 3 non-collinear points P = (–2, 1, 0), Q = (–1, 3, 1) and R = (2, –2, 3).

(a) Find the standard form equation of the plane.
(b) The line l passes the points P and Q. Find its two-point vector form equation. Find the corresponding parametric equations.

[6] 3. Find the dihedral angle between the planes having equations
$3x - y + 2z = 6$ and $2x + 3y - 4z = 8$.

[6] 4. Find the acute angle between the skew lines
$l_1 : x = -2 + 2t,\ y = 3 - t,\ z = -1 + 3t$ and $l_2 : x = 3 - t,\ y = -2 + 4t,\ z = 1 - 2t$

[12] 5 (a) Suppose you have a point P = (–2, 4, –3) and the plane $3x - 2y + 5z = 9$. Find the distance between the point P and the plane.

5 (b) Suppose you have a point Q = (-1, 2, -3) and a line having parametric equations $x = -1 + t,\ y = 2 - 4t,\ z = -3 + 3t$. Find the distance between the point Q and the line.

6. Given the pair of lines
$l_1 : x = 2 - 3t,\ y = 4 + t,\ z = -3 + 2t$
$l_2 : x = -1 + 2t,\ y = -3 + 3t,\ z = 4 - t$
Find the following:

[3] (a) A vector **n** that is orthogonal to both lines l_1 and l_2.

[3] (b) Sine of the angle between the lines l_1 and l_2.

[5] (c) The distance between the lines l_1 and l_2.

[10] 7. Given the point P = (2, –2, 4) and the plane $2x + y - 3z = 8$, find the following.

(a) A set of parametric equations for the line through P that is also orthogonal to the given plane.

(b) Let L be a line with parametric equations; $x = 2 + 2t$, $y = -2+t$, $z = 4 - 3t$. Find the point of intersection of L with the plane $2x + y - 3z = 8$