

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. Suppose you have a point $P = (-2, 4, -3)$, the plane $3x - 2y + 5z = 9$ and a line having parametric equations $x = -1 + t, y = 2 - 4t, z = -3 + 3t$
- (a) Find the distance between the point P and the plane.
- (b) Find the distance between the point P 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 \mathbf{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) The point of intersection of the line from part (a) with the given plane.