MATH 1300 D01/D02 Fall 2015 Assignment 2

SHOW ALL WORK to get full marks. Leave answers as exact answers. For example, leave it as 1/7 as opposed to 0.142857.

[5] 1. Determine an equation of the plane through the points $P(1,\ 2,\ 3)$, $Q(3,\ 2,\ 1)$ and $R(-2,\ 4,\ 1)$. Your answer should be in standard form.

[5] 2. Determine an equation of the line through the points $P(2,\ -2,\ 3)$ and $Q(3,\ 5,\ -1)$ in:

(a) parametric form.

(b) symmetric form.

3. For the lines

$$x = 11t,\ y = -3 + 2t,\ z = 2 - 7t \text{ and } \frac{2x-1}{22} = \frac{y+2}{2} = \frac{1-z}{7}:$$

[2] (a) Show that the lines are parallel.

[5] (b) Calculate the distance between the parallel lines.

4. For the lines

$$\mathbf{x_1} = (1,\ 2,\ 3) + s(1,\ -3,\ 0) \text{ and } \mathbf{x_2} = (1,\ -7,\ 2) + t(2,\ -2,\ 3):$$

[5] (a) Show that the lines are skew.

[4] (b) Calculate the cosine of the angle between the skew lines.

[5] (c) Calculate the distance between the skew lines.

[6] 5. (a) Determine the two planes parallel to the plane $x+2y-3y = 5$ such that the distance from the point $P(1,-3,6)$ to the plane is 2 units.

[4] (b) Calculate the cosine of the smallest angle between the plane from part (a) and the plane $4x - 3y + 5z = 18$.

[6] 6. Determine the line of intersection (in parametric form) between the two planes $x + 2y - 7z = 5$ and $2x - 3y - 4z = 3$.

[6] 7. For which value of the constant p does the line

$$\mathbf{x} = (4,\ 0,\ 1) + t(2,\ 5,\ p)$$

and the plane

$$x + 2y + 3z = 8$$

not intersect.

[7] 8. Determine whether the lines

$$\mathbf{x_1} = (3,\, 4,\, 2) + s(1,\, 1,\, 2) \text{ and } \mathbf{x_2} = (-1,\, 6,\, -6) + t(2,\, -2,\, 4)$$

intersect. If they do intersect, then determine the point of intersection.

This assignment is out of 60 points.