MATH 1300 D01/D02 Winter 2016 Assignment 2

SHOW ALL WORK to get full marks. Leave answers as exact answers. For example, leave it as fractions such as 1/7 as opposed to decimals such as 0.142857. Word problems should have sentence answers with units. Fractions should be lowest terms.

[5] 1. Determine an equation of the plane through the points $P(1, -1, 3)$, $Q(2, -1, 0)$ and $R(3, 1, -2)$. Your answer should be in standard form.

[5] 2. Determine an equation of the line through the points $P(1, -3, 2)$ and $Q(6, 2, -1)$ in:

(a) parametric form.

(b) symmetric form.

3. For the lines

$$x = 5t,\ y = 2 - 3t,\ z = 3 - 2t \text{ and } \frac{2x-3}{10} = \frac{y-1}{-3} = \frac{4-z}{2} :$$

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

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

4. For the lines

$$\mathbf{x_1} = (1, 2, -3) + s(1, -2, 0) \text{ and } \mathbf{x_2} = (1, -3, 1) + t(1, 5, 3) :$$

[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 $2x+y-4z = 5$ such that the distance from the point $P(1, 2, 2)$ to each of theses two planes is 3 units.

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

[6] 6. Determine the line of intersection (in parametric form) between the two planes $x + 3y - 5z = 1$ and $2x - y + 3z = -5$.

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

$$\mathbf{x} = (3, 0, -1) + t(2, 1, p)$$

and the plane

$$3x - 2y + 4z = 8$$

not intersect.

[7] 8. Determine whether the lines

$$\mathbf{x_1} = (6,\ 5,\ -4) + s(1,\ -1,\ 2) \text{ and } \mathbf{x_2} = (-12,\ -2,\ 10) + t(3,\ 2,\ -4)$$

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

This assignment is out of 60 points.