MA261 Quiz 2

June 21, 2016

Problem 1.

Determine a so that the line

$$\frac{x-1}{a} = \frac{y+2}{2} = \frac{z-5}{3}$$

is parallel to the plane

x + 2y - 2z = 3

Solution.

A directional vector of the line is $\langle a, 2, 3 \rangle$ and this vector is perpendicular to the normal vector $\langle 1, 2, -2 \rangle$ of the plane. Therefore,

$$\langle a, 2, 3 \rangle \cdot \langle 1, 2, -2 \rangle = a + 4 - 6 = a - 2 = 0$$

So, a = 2.

Problem 2.

Find the angle between the planes

$$y + z = 2$$
$$2x + y + 2z = 5$$

Solution.

The angle between the planes is the angle between the normal vectors.

$$cos(\theta) = \frac{\langle 0, 1, 1 \rangle \cdot \langle 2, 1, 2 \rangle}{\sqrt{0^2 + 1^2 + 1^2} \sqrt{2^2 + 1^2 + 2^2}}$$
$$= \frac{3}{3\sqrt{2}} = \frac{\sqrt{2}}{2}$$

So, $\theta = \pi/4$.