HW #3

Question 1. Determine whether the following pairs of lines (in 3D) are parallel, intersecting or skew. If they intersect, find the point of intersection.

(1) $L_1 : x = 2 + 3t, \quad y = -4 + t, \quad z = 2t$
$L_2 : x = -3 - 4s, \quad y = -1 + s, \quad z = -8 - 5s$

(2) $L_1 : x = -3t, \quad y = 3t + 2, \quad z = t + 1$
$L_2 : x = 3 - s, \quad y = 3 - s, \quad z = s - 3$

Question 2.

(1) Find an equation of the line of intersection of the two planes

$$P_1 : x + y + z = 4, \qquad P_2 : 2x + 3y + 4z = 3.$$

(2) Determine whether the following line and plane are parallel or intersecting. If they intersect, find the point of intersection.

$$L_1 : x = -t + 1, \quad y = t + 4, \quad z = t - 3, \qquad P_1 : 3x - 2y + 5z = -2.$$

Question 3.

(1) Find the angle between the two planes

$$P_1 : 6x + 2y - 3z = 2, \qquad P_2 : 9x - 4y - z = 5$$

(2) Find the angle between the line and the plane

$$L_1 : x = t + \sqrt{2}, \quad y = \sqrt{2}t - 1, \quad z = 2, \qquad P_1 : \sqrt{3}y + z = \sqrt{3}$$

Question 4.

(1) Find the distance between the line and the plane

$$L_1 : x = 4t - 1, \quad y = 4t - 8, \quad z = 3t + 1, \qquad P_1 : 4x - 7y + 4z = -25$$

(2) Find the distance between the two lines

$$L_1 : x = t, \quad y = 2t - 3, \quad z = t - 3,$$
$$L_2 : x = 5s - 2, \quad y = s - 2, \quad z = -s + 3$$