MA 203 Problems 1

1. Let $u = (1, 2, 1, 3)$,$v = (-2, 1, 0, 5)$ and $w = (1, -1, 5, 3)$. Calculate the following:
(i) $u + v$, (ii) $v - w$, (iii) $4v + 2w$, (iv) $u \cdot (v + w)$, (v) $u \cdot v + u \cdot w$ and (vi) $\|u\|$.

2. (a) Find the parametric equation of the line in $\mathbb{R}^3$ in the direction $v = (2, 1, 3)$ and containing the point $P = (-1, 3, 4)$. Find the angle between the vectors P and v.

(b) Find the parametric equation of the line in $\mathbb{R}^3$ containing the points $(1, 2, 4)$ and $(2, 3, 6)$. At what point does this line intersect the x_1x_2-plane?

(c) Find the parametric equation of the line $x + 3y = 10$. in $\mathbb{R}^2$

3. (a) Find the equation of the plane Π in $\mathbb{R}^3$ with normal (vector) $n = (3, -2, 1)$ and containing the point $P = (1, 2, 1)$.

(b) Find the distance from the point $Q = (2, 3, 6)$ to the plane Π in part (a).

4. (a) Determine whether the lines in Q2.(a) and Q2.(b) intersect or not.

(b) Fine the equation of the plane containing the points $(2, 1, 2)$, $(3, -8, 6)$ and $(-2, -3.1)$.

(c) Find the equation of the plane through the point $(3, -2, 8)$ and parallel to the plane $x + y + z = 0$

5. Find all solutions of the following system of linear equations:

$$\begin{aligned} x + y - 2z + 3u + 4v &= 7 \\ 2x + y - 3z + u + 5v &= 6 \\ x + y + z + u + v &= 5 \\ 2x + 2y + 3z + 3u - 5v &= 5 \end{aligned}$$