1) Consider the vectors $u = (-2,4,-8)$, $v = (5,2,0)$ and $w = (4,1,8)$.
   a) Determine whether the angle between u and v is acute, obtuse or they are orthogonal.
   b) Find the vector component of u along w and the vector component of u orthogonal to w.
   c) Find a vector orthogonal to both u and v.
   d) Find the norm of $u + 2v$.
   e) Find the volume of the parallelepiped in the 3-space determined by the vectors u, v and w.

2) a) Find the equation of the plane passing through the point $P(-1,2,-3)$ and parallel to the plane whose equation is $2x - 2y + z + 10 = 0$.

b) Show that the planes $3x - 4y + z - 1 = 0$ and $6x - 8y + 2z - 3 = 0$ are parallel and find the distance between them.

c) Find parametric equations for the line passing through $P(3,-1,2)$ and which is parallel to the vector $n = (2,1,3)$.

d) Find the equation of the plane passing through the points $(1,1,1)$, $(2,-1,3)$ and $(1,3,4)$.

3) Consider the linear operators $T: R^2 \to R^2$ and $S: R^2 \to R^2$ where T has the standard matrix representation $[T] = \begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix}$ and S is the rotational operator counterclockwise by an angle $\frac{\pi}{3}$.

a) Is the operator T one to one ? Onto? Why?

b) Find the vector $v = (ToS)(u)$, where $u = (\frac{\sqrt{3}}{2}, 0)$.

c) Find $T(2,2)$ and $S(1,-1)$.

d) Find $(SoT)^{-1}(w)$ if exists, where $w = (1,1)$.