Q1 / If V and W are finite dimensional vector spaces, then V isomorphic to W if and only if dimV=dim W, prove.

Q2/ Let T$\in $L(R3, R2) defined by T(x,y,z) = (x+y, x+z). Find the basis for R3 and R2 which the matrix MT for T relative to this basis is normal form.

Q3/A- Define linear transformation, Is T: $M\_{2×2}$(R) → R4, defined by T$\left[\begin{matrix}a&b\\c&d\end{matrix}\right]$= ( a, -b, 0, d), linear transformation?

 B- Let V and W be vector spaces over F and T: V→ W be a linear transformation, then T is one to one if kernT ={0}. Prove.

Q4/ Define kernel, and Image of linear transformation, if T: P2(R)→ R4 be a linear transformation defined by T(a+bx+cx2) = (a+b, 0, a+b, 3c), then find the following:

 1- kernT and ImagT.

2- rank and nullity of T

3- Is T bijective (one to one and on to)?

Q5/ A- If T : P1(R) → P2(R) defined by T(a+bx) = ax +bx2, find the matrix MT relative to the basis {2, 1-x} for P1(R) and { -1, 3x, -2x2} for P2(R).

Q6/ Define the inverse of linear transformation T, If T: R2 → R3 defined by T(x,y) =( x, x+2y, x-y), and S: R3 → R2 defined by S(x, y, z) =(x, y-2x+z), show that S is left inverse of T. Is S right inverse of T?

Q7/ Define the isomorphism of Linear transformation, If T: R3→ R be linear transformation defined by T(x, y, z) = x-y+z, then answer the following:

1. Find Kernal(T) and Imag(T).
2. Find rank(T) and Nul(T).
3. Is T bijective? (one to one and onto).

Q8/ Let V and W be finite dimensional vector spaces, the V isomorphic to W if and only if dimV=Dim W, prove.

Q / Define a basis of vector space and find a basis for subspace M,

 M= { a+bx + cx2 $\in $ P2(R): a+b =0} of P2(R).

Q/ A- A function T:U →V is a linear transformation if and only if for all u,v $\in $ U, and a$\in $ F, T(au+v)= aT(u) + T(v), prove.

 B- Show that M={$\left[\begin{matrix}a&b\\c&d\end{matrix}\right]$: a,b,c,d $\in $ R and d=b+c } is a subspace of $M\_{2×2}$.

Q/ / Let S={ x2+1, x-1, 2x+2} be a subset of vector space P2(R) over the field R, Show that S Spans P2(R), { <S>= P2(R)}. Q/ In R3, U={ (x, y, z) : z=x+2y} and W= { (x, y, z) : x= -y} be two vector subspaces over the field R, find dim(U +W) and U+ W.

 Q/ Define a coordinate vector. Find the coordinate vector of u= 5x-2 in P1(R) with respect to the basis S= { x+1, x-1}.