IGEE-UMBB

EE 174 : Recitations set 3

1. Check the linear independence of the following vectors of R^3
   a) $\{(0,0,-1);(1,0,4)\}$
   b) $\{(1,1,0);(-1,2,0)\}$
   c) $\{(1,1,0);(-1,1,2);(0,2,2)\}$

2. Let P_2 be the space of real polynomials of degree≤ 2 ; Check the linear independence of the following sets
   a) $\{1,x,x^2\}$
   b) $\{-1+4x-x^2, 1+7x, 2+3x+x^2\}$
   c) Can we select a basis for P_2 from these sets?

3. Let $S=\{v_1,v_2,\cdots,v_k\}$ be a subset of the vector space $V(F)$; Show that $[S]=[v_1,v_2,\cdots,v_k]=[v_1,v_2,\cdots,v_k,v_{k+1}]$ **if and only if** $v_{k+1}\in[v_1,v_2,\cdots,v_k]$ for any $v_{k+1}\in V(F)$. What conclusions can you draw from this result?

4. Let S,T be linearly independent subsets of vectors of the vector space $V(F)$
   a) Is $S\cap T$ linearly independent ? Justify.
   b) Are the complements $\bar{S}$ and $\bar{T}$ linearly independent? Justify.

5. Let P_3 be the space of real polynomials of degree≤ 3 ; Is the subset $\{1, 1+x, 1+x+x^2, 1+x+x^2+x^3\}$ a basis for P_3? If so, express $p(x)=x^2+x^3$ in this basis.

6. Find a basis and the dimension of the solution space of the following system of linear equations:

$$x_1-4x_2+3x_3-x_4=0$$
$$2x_1-8x_2+6x_3-2x_4=0$$