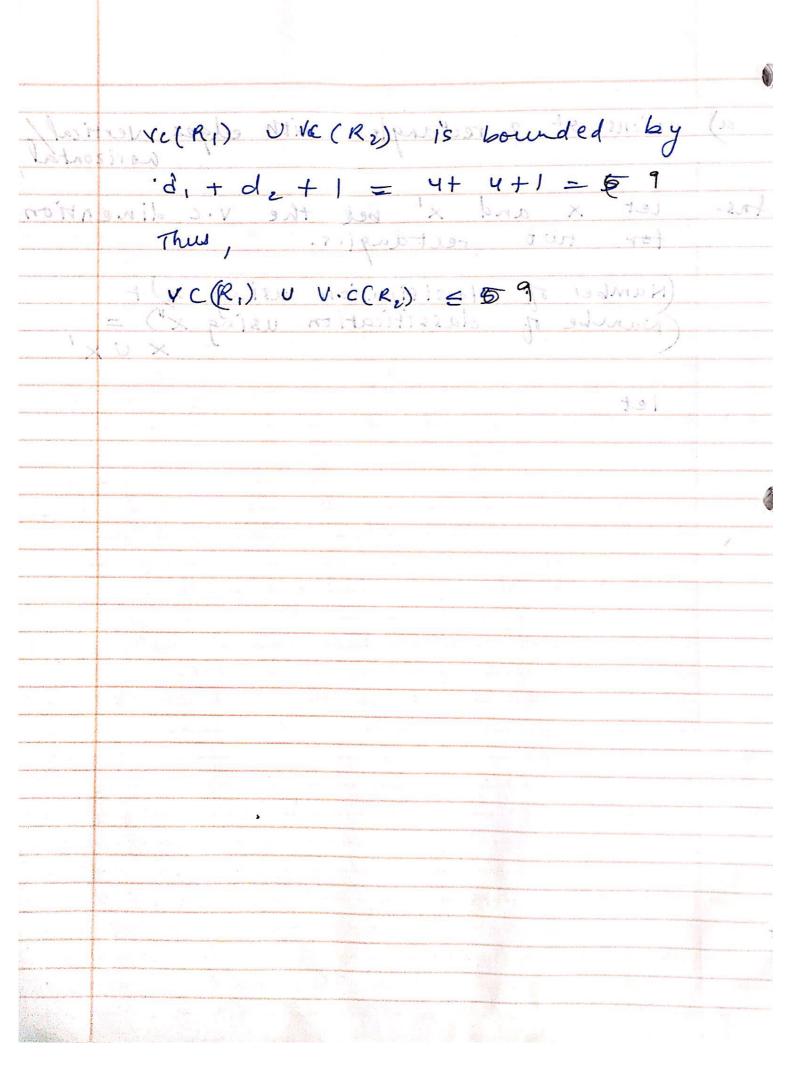
Problem 6 a) Union of z rectangles to the Ans.  $V \subset (R_1) = d_1$   $V \subset (R_2) = d_2$ Th: 17 Hi (2d+c) = = (2d+c) where d = max (d, , d) 4 c>1  $\underset{k=0}{\overset{d}{\leq}} \left( 2d+c \right) = 1 + \underset{k=1}{\overset{d}{\leq}} \left( 2d+c \right)$ = 1 + 2 (2d + c - 1) + 2 (2d + c - 1)Using the formula, (n+1) = (n) + (n) (k)  $= \underbrace{\frac{d}{2d+c-1}}_{K=1} + \underbrace{\frac{d}{2d+c-1}}_{k}$  $= \underbrace{\begin{cases} zd + (-1) \\ k = 1 \end{cases}} \underbrace{\begin{cases} zd + (-1) \\ k$  $\leq \leq \left(\frac{2d+c-1}{2d+c-1}\right) + \leq \left(\frac{2d+c-1}{i}\right)$ -1 + 2 2 d + c -1



2000 1015 and circle c2 for other labelling. Ans For a non-linear- (strit) wt (sxaix) easily (x, xe) duct (y, ye) + elevis a ward - Make of the points Then, symmetric difference of the circles under consideration would be ((C1 (c2) U (GCZ (C1))))
There would consist of 4 disjoint regions which is not possible. Thus V.C. dimension of acircle visanis - Lancider 4 collingar points +-+ 1(4, 4) - ore - (1, 4) + would be impossible

c) triangleis on no ething + replience (0 consider 7 points on a circle, one edge of the triangle can be used to cut of each block. There can be maximum of a contiguous blocks of -ve (when arranged in circular way). Thus, they can be separated using 3 corners of the triangle. Hence 7 points can be shattered. Ine. How, it we consider a points on circle z, , x, ... x A triangle can intersect a circle at most at 6 points. Hence it is impossible to have a triangle (1) containing exactly x, x, xs, xz in exterior and xz, xy, xc, x8 in its interior. Thus V.C. dimention of triangle is 7.

d) multidimensional sphere

A sphere in m space given by  $+(x) = sign \Gamma(x-a)(x-c) - by$ 

Consider m+1 points consisting of the unit vectors and the origin can be shattered by spheres.

Assume a jsubset P of m+1 points. The centre b of the sphere is the sum of the vectors in P.

unit vector in P, distance to centre: JPI-1 unit vector outside P, distance to centre: VPI+1

JIPI = distance of origin to centre.

Thus, if we choose the radius sothe points in P are the sphere, then m+1 is the V.C. dimension for sphere in m dimension.