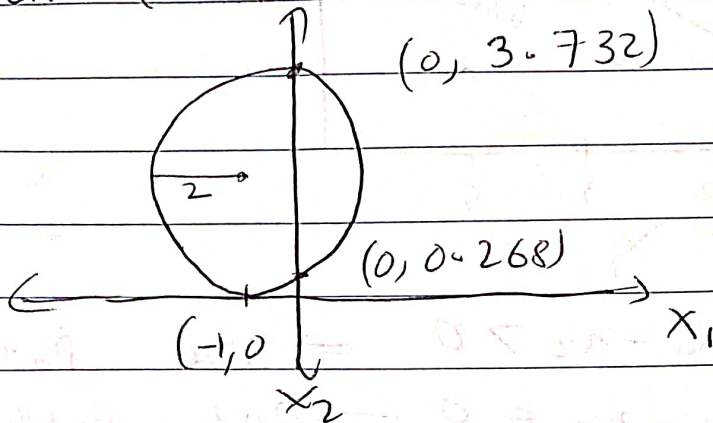


HW6

* Exercise 9.7

Q.2)

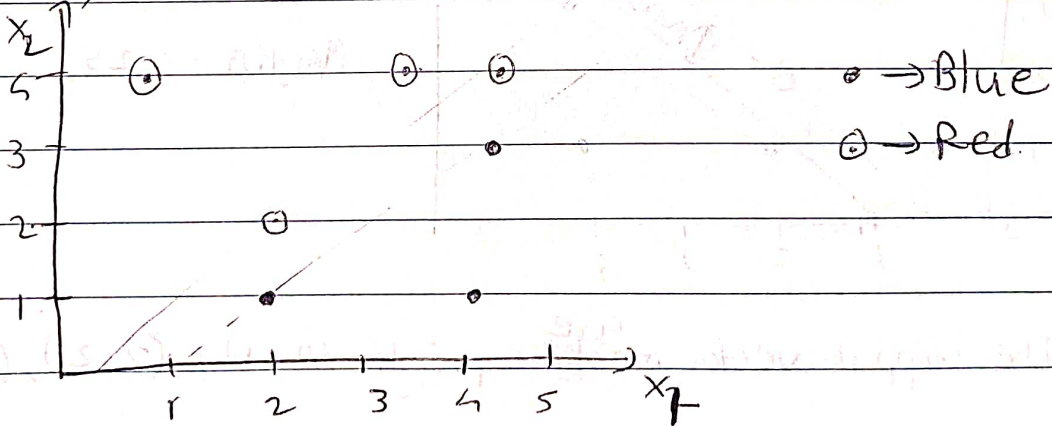
a) sketch $(1+x_1)^2 + (2-x_2)^2 = 4$



The equation gives a circle with radius 2.

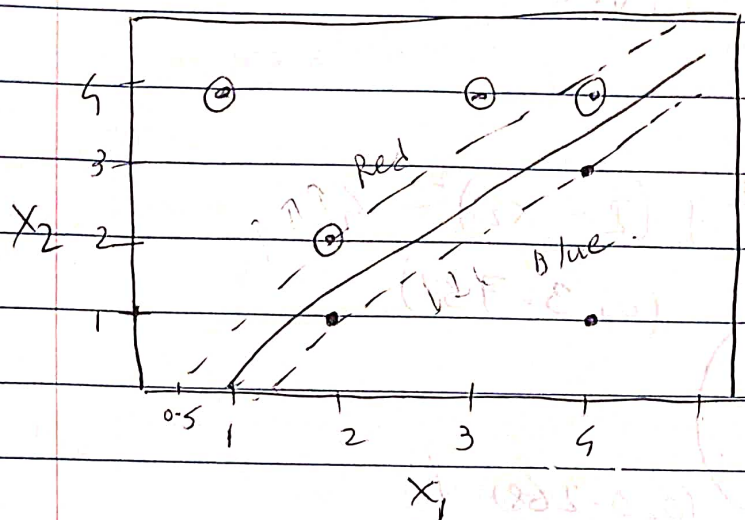
Q.3)

a) $n=7$, $p=2$

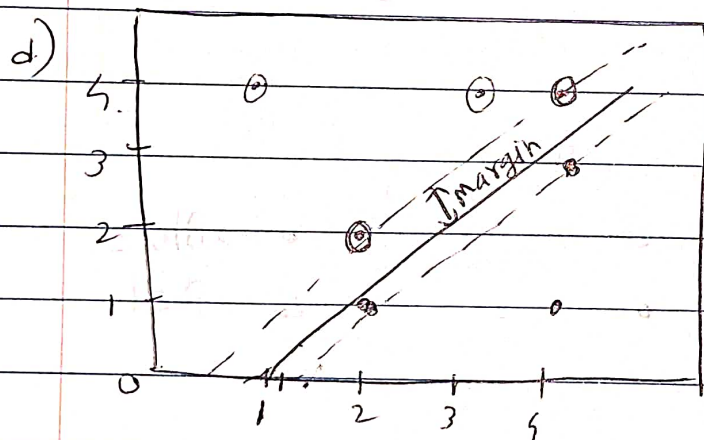


b)	x_1	x_2	Hyperplane eqn.
1	0,5		intercept = $-1/2$
2	1,5		slope (m) = 1
3	2,5		$\therefore x_2 = \frac{-1}{2} + x_1$

$$x_1 - x_2 - 0.5 = 0$$



c) $-0.5 + x_1 - x_2 > 0 \Rightarrow \text{Blue}$ $\beta_0 + \beta_1 x_1 + \beta_2 x_2 > 0$
 $-0.5 + x_1 - x_2 \leq 0 \Rightarrow \text{Red}$ $\beta_0 + \beta_1 x_1 + \beta_2 x_2 \leq 0$
 $\beta_0 = -0.5, \beta_1 = 1, \beta_2 = -1$

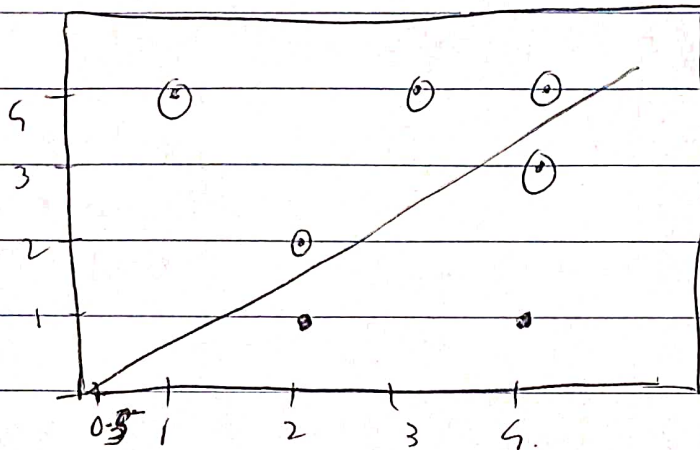


$-0.5 + x_1 - x_2 = 0$
Margin = 0.25

e) The support vector ^{are} machine points $(2, 1), (2, 2), (4, 3), (4, 4)$

f) From the plot above, it is clear that even if we move 7th observation $(4, 1)$, it would not change maximal margin hyperplane as it is not a support vector machine. only support vectors points can have any effect on maximal margin hyperplane.

g)



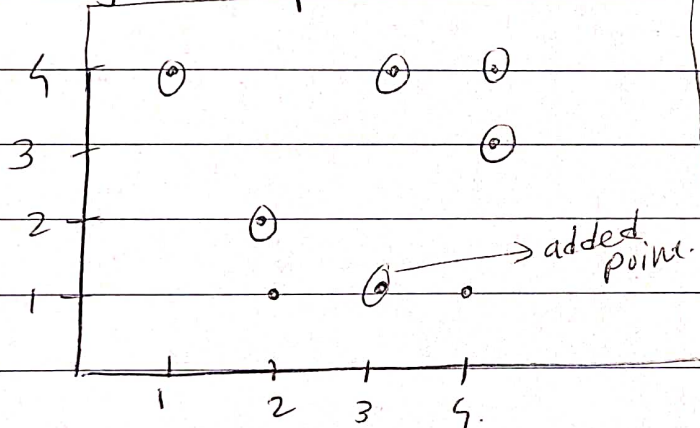
$x_1 - x_2 = 0.3$ is not an optimal separating hyperplane

$$x_1 - x_2 - 0.3 = 0$$

intercept = -0.3

slope = +1

h) Adding a red point (3,1) to the plot



Now, after adding (3,1) Red point, the two classes are not separable as the point (3,1) is under blue region but the point added is red