Homework 3 - Advanced Machine Learning

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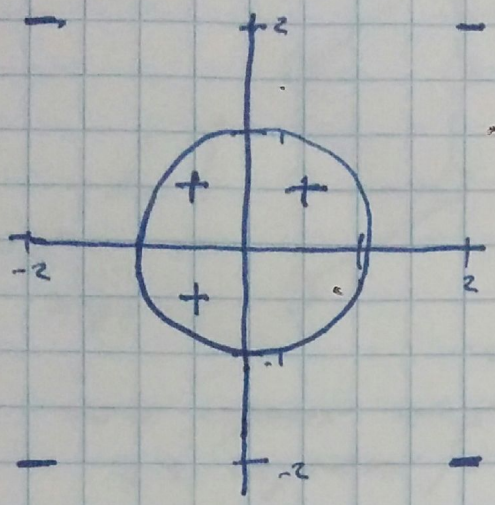
1)

a)



b) $x_1^2 + x_2^2 \leq 1$

$0 \leq 1 - x_1^2 - x_2^2$

$\beta_0 : 1 \quad \beta_1 : -1 x_1^2 \quad \beta_2 : -1 x_2^2$

c)

i) $P(+ \mid 0.5, 0.5) = \frac{1}{1 + e^{-(1 - x_1^2 - x_2^2)}} = 0.6225$

$= \frac{1}{1 + e^{-(1 - 0.5^2 - 0.5^2)}}$

$= \frac{1}{1 + e^{-(1 - 0.25 - 0.25)}}$

$= \frac{1}{1 + e^{-0.5}} = \frac{1}{1 + \frac{1}{\sqrt{e}}} = \frac{1}{1 + .6065} = .6225$

ii) $P(+ \mid -2, -2) = \frac{1}{1 + e^{-(1 - 2^2 - 2^2)}} = \frac{1}{1 + e^{-(1-4-4)}} = \frac{1}{1 + e^7} = \frac{1}{1097,633}$

$= 0.000911$