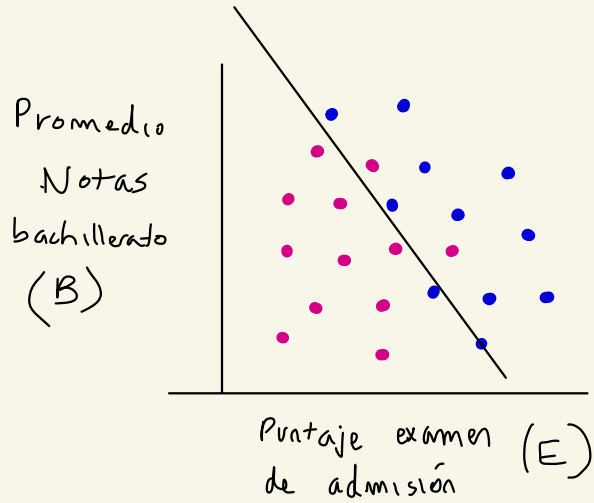
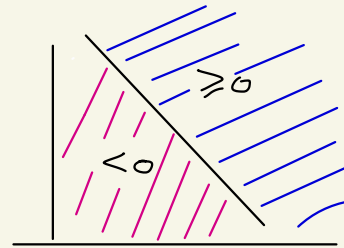


Decisión de admisión a una universidad



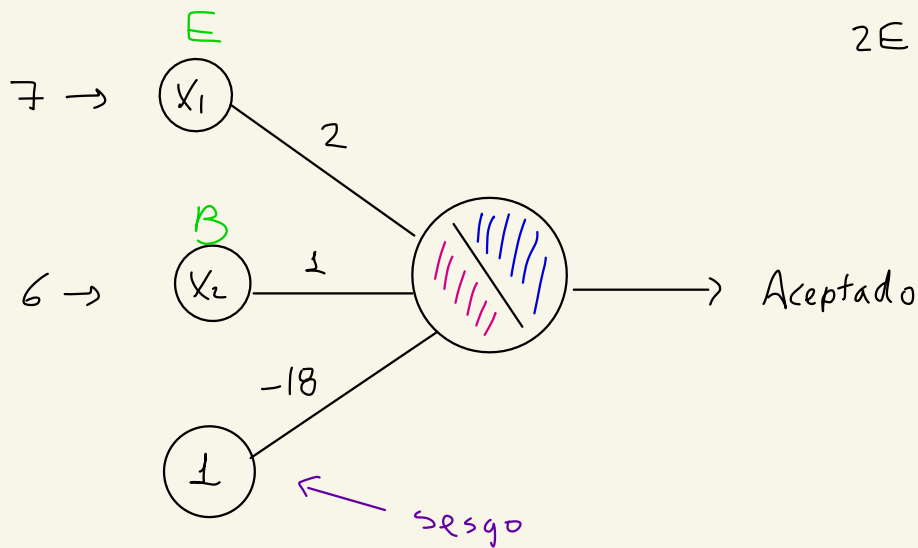
$$2X_1 + X_2 - 18 = 0$$

$$2E + B - 18 \begin{cases} \geq 0 & \text{Aceptado} \\ < 0 & \text{Rechazado} \end{cases}$$



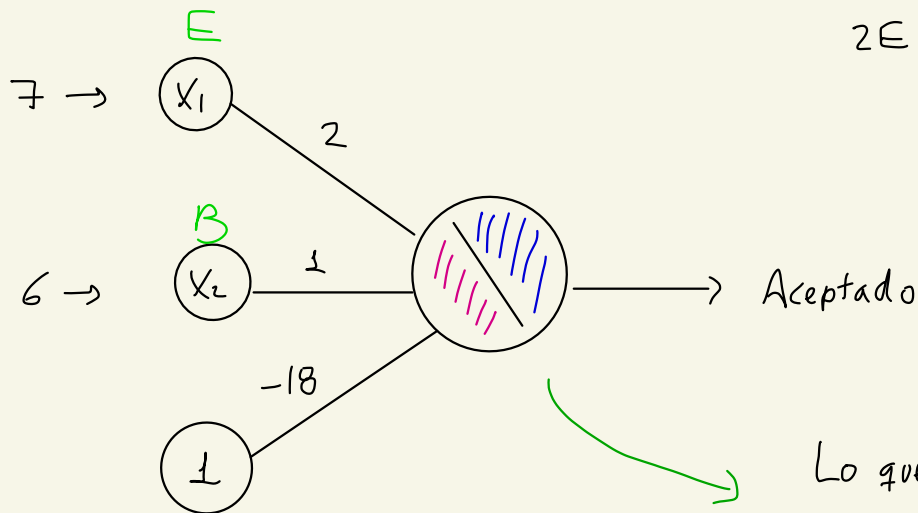
$$2x_1 + x_2 - 18 = 0$$

$$2E + B - 18 \begin{cases} \geq 0 & \text{Aceptado} \\ < 0 & \text{Rechazado} \end{cases}$$

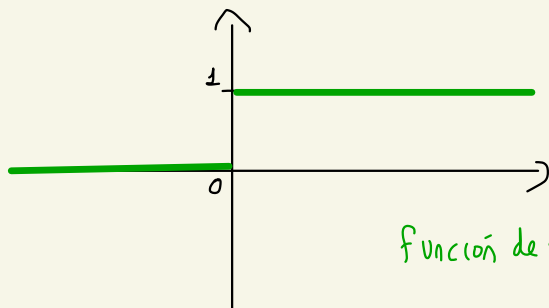


$$2x_1 + x_2 - 18 = 0$$

$$2E + B - 18 \begin{cases} \geq 0 & \text{Aceptado} \\ < 0 & \text{Rechazado} \end{cases}$$

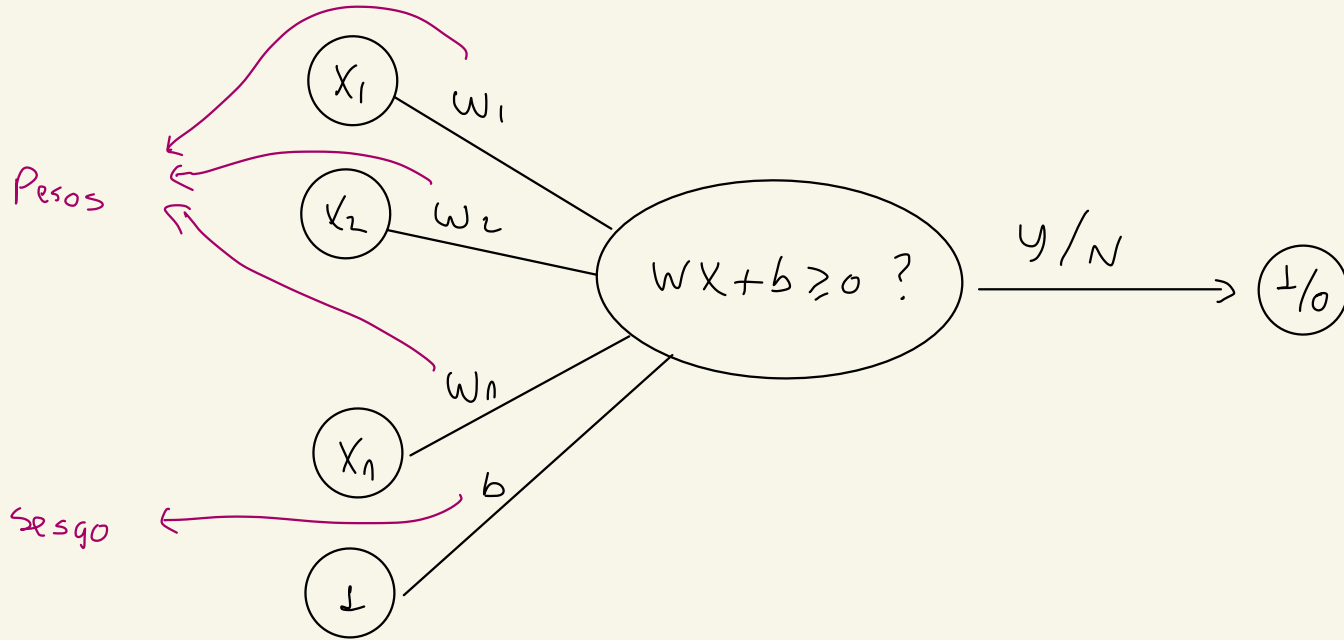


Lo que ocurre en este nodo

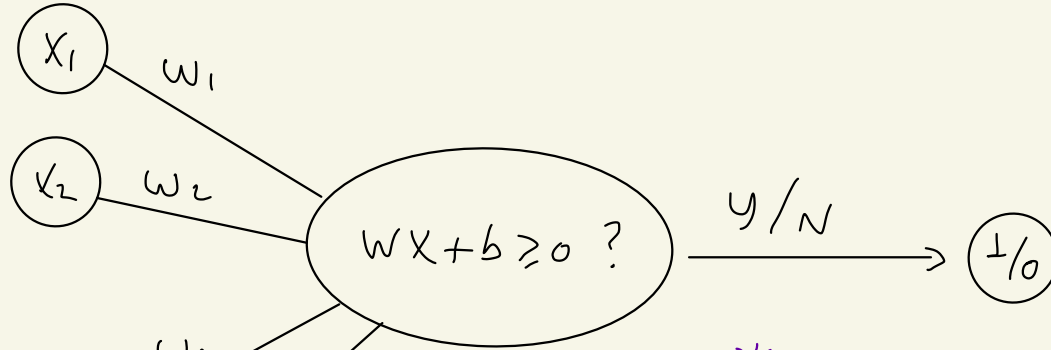


función de salto

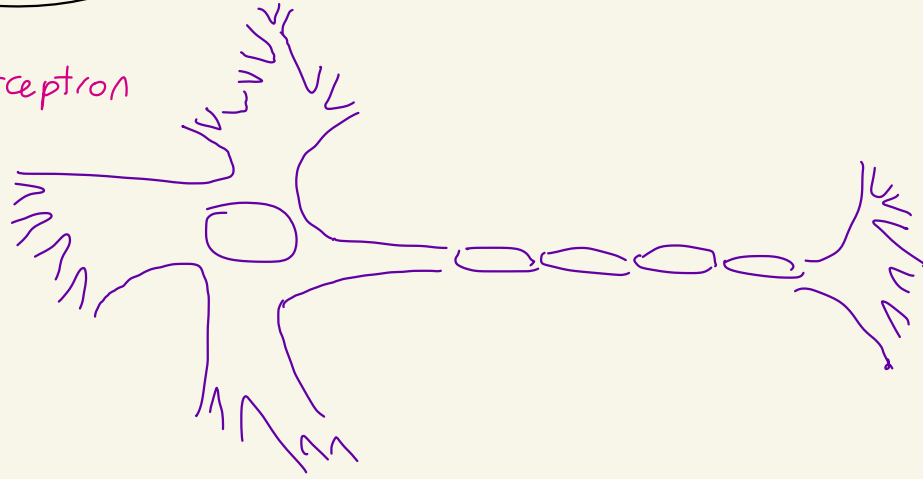
En general



En general



Perceptron

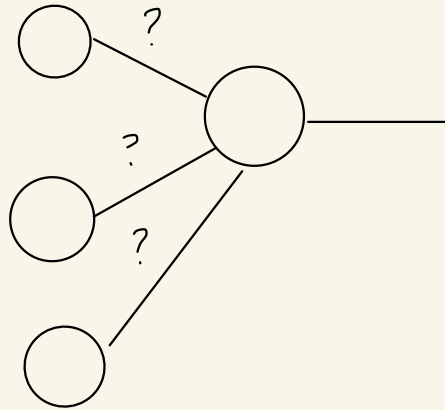


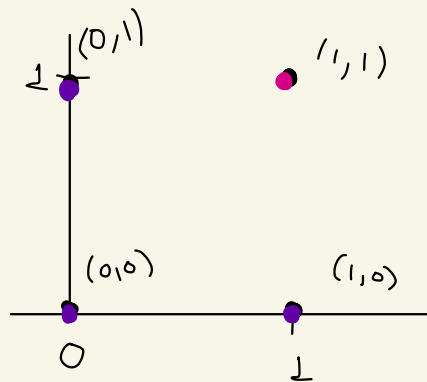
Representar funciones?

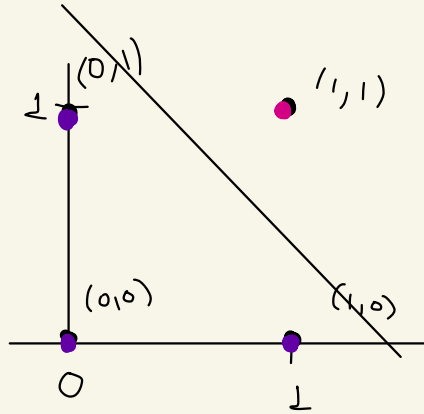
Funciones lógicas

AND

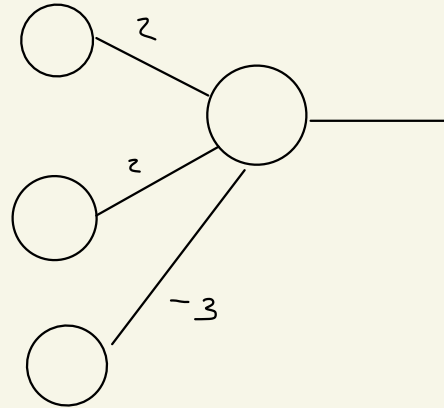
| | | |
|---|---|---|
| 1 | 1 | 1 |
| 1 | 0 | 0 |
| 0 | 1 | 0 |
| 0 | 0 | 0 |





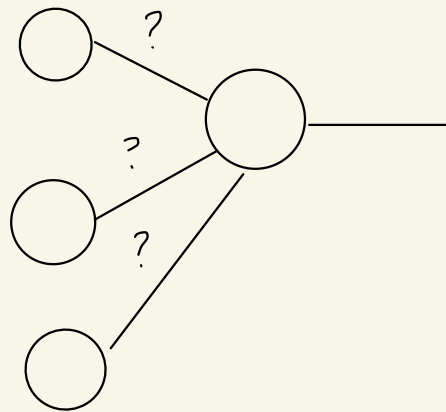


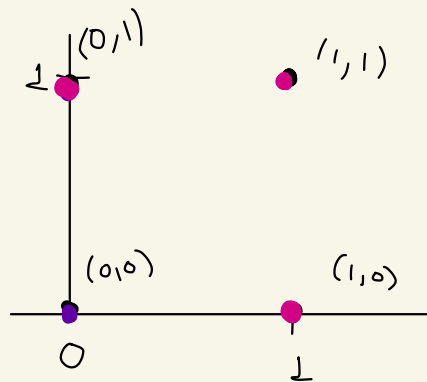
$$2x + 2y - 3 = 0$$



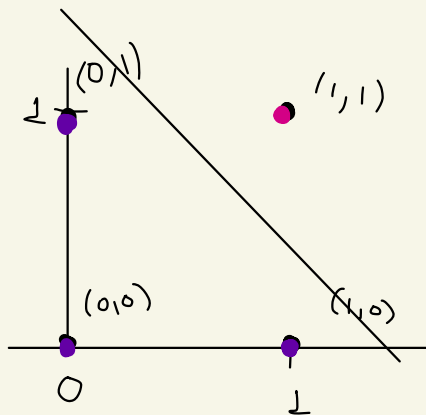
OR

| | | |
|---|---|---|
| 1 | 1 | 1 |
| 1 | 0 | 1 |
| 0 | 1 | 1 |
| 0 | 0 | 0 |

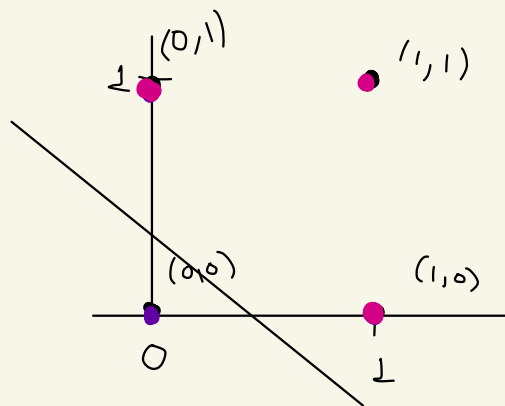


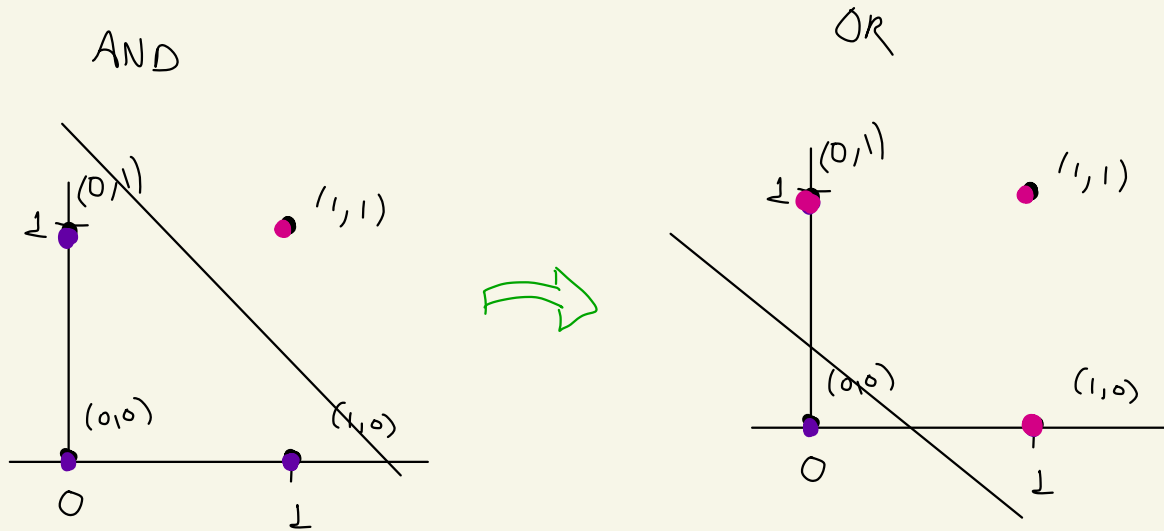


AND



OR





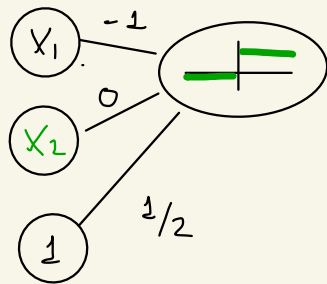
Aumentar los pesos!

o

decrecer el sesgo

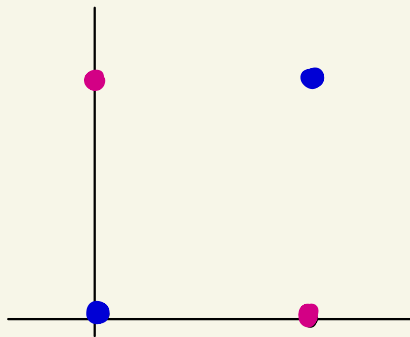
NOT

| | |
|---|---|
| 0 | 1 |
| 1 | 0 |

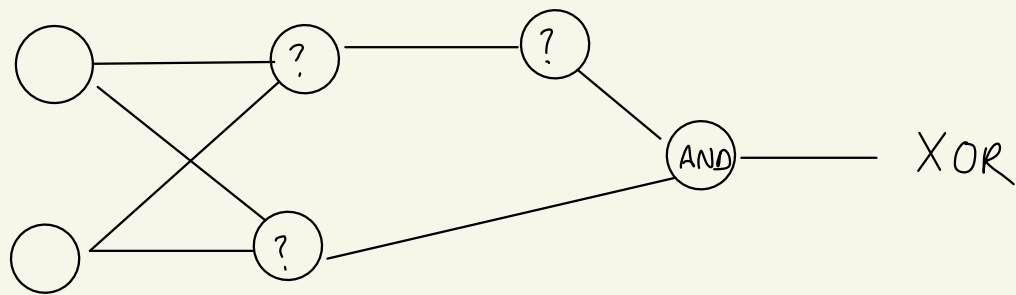


XOR

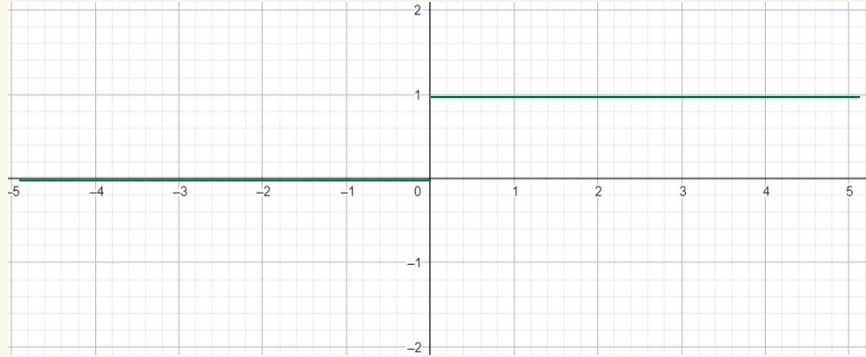
| | | |
|---|---|---|
| 1 | 1 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 0 | 0 | 0 |



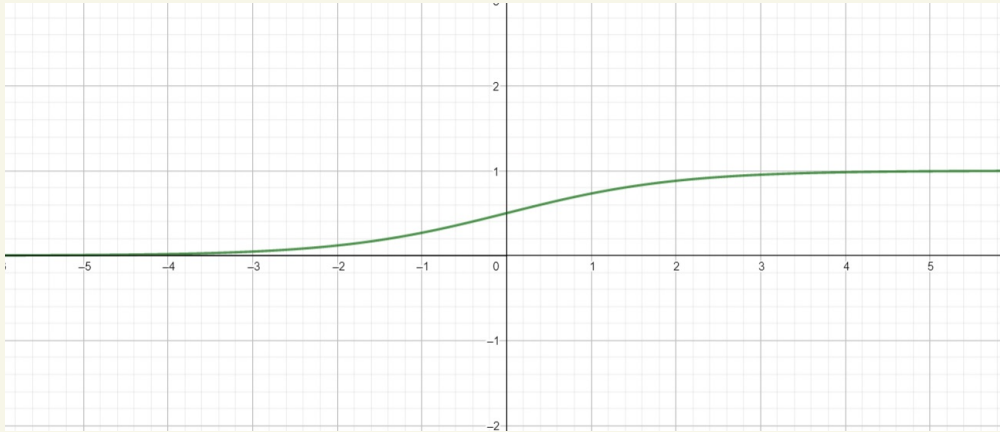
?



De discreto a continuo

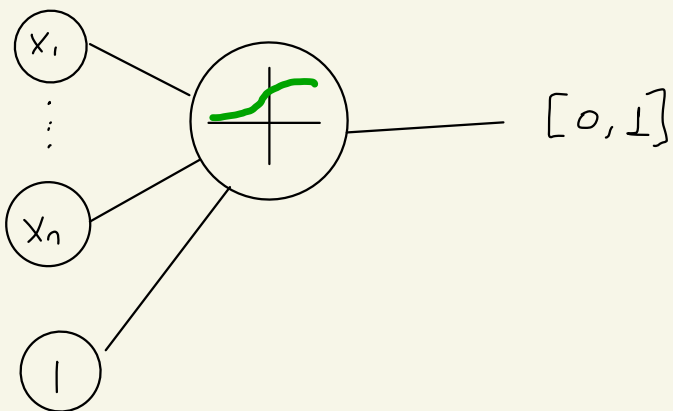
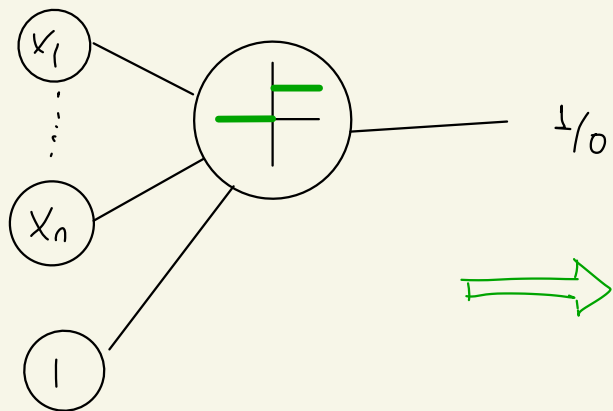


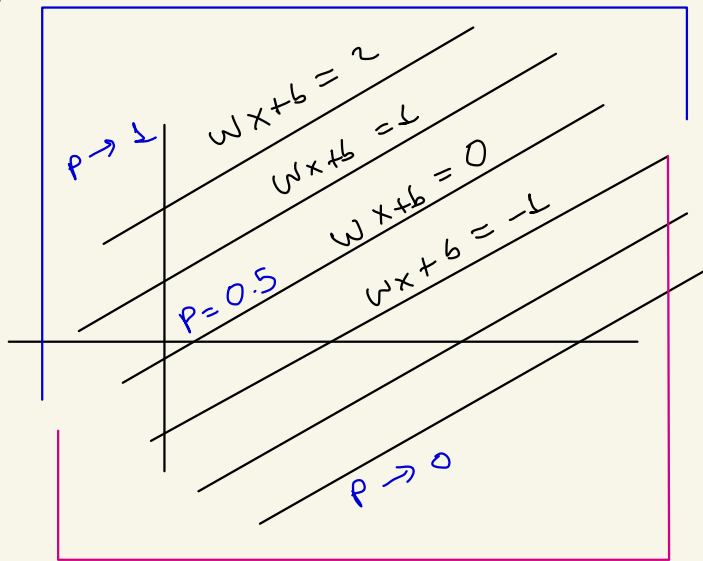
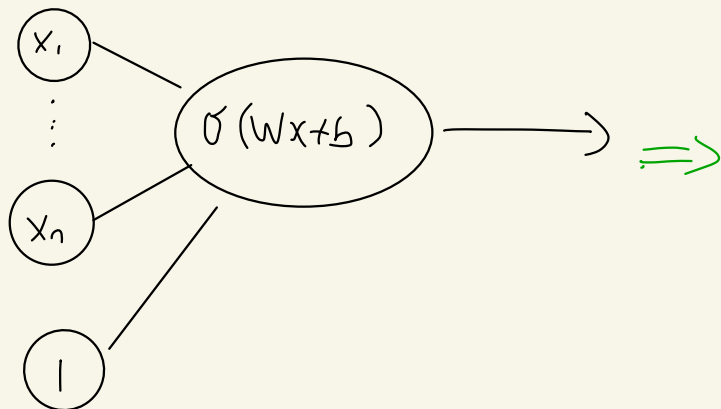
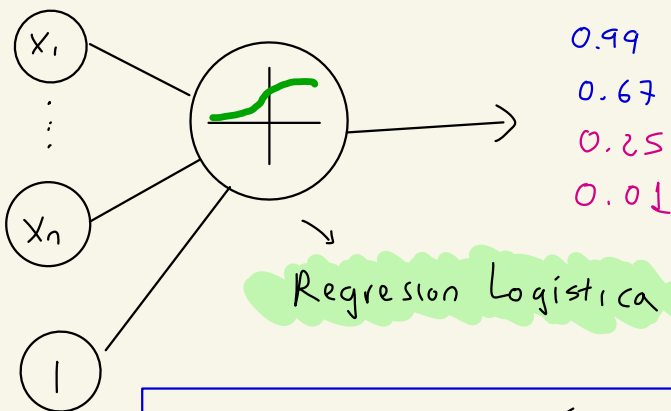
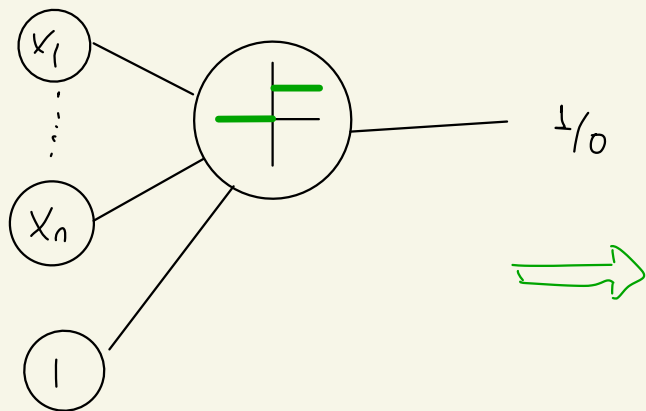
función de salto

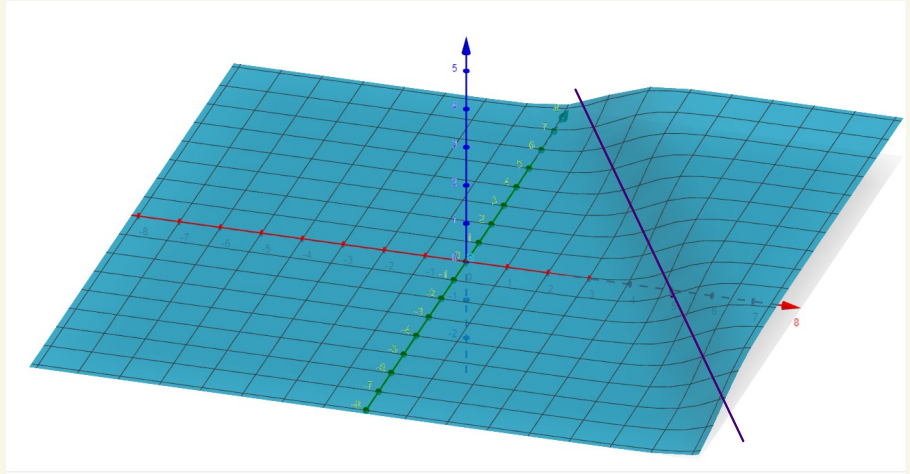
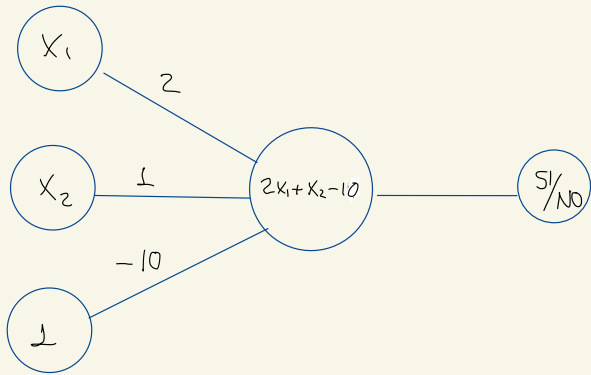
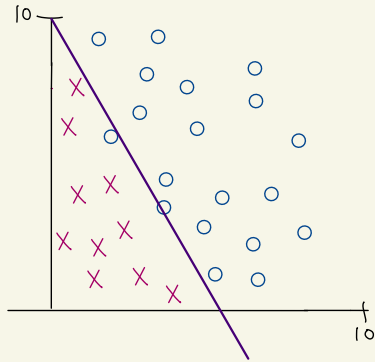


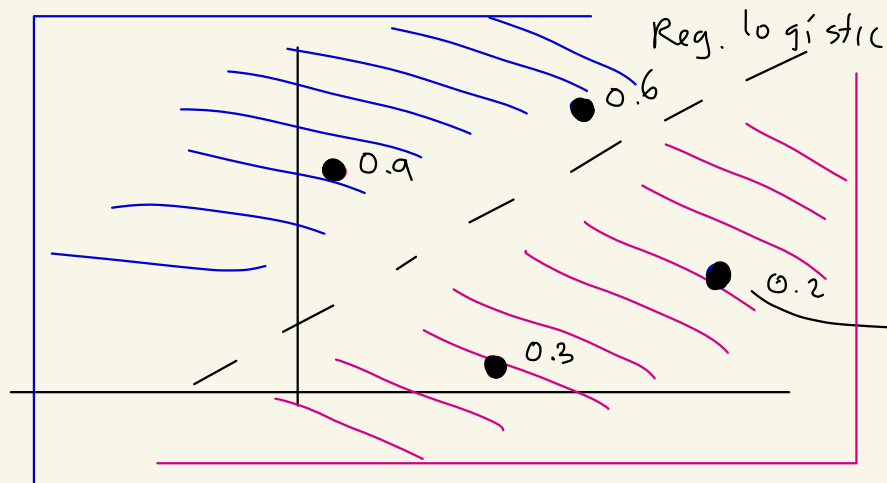
Sigmoide

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





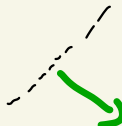


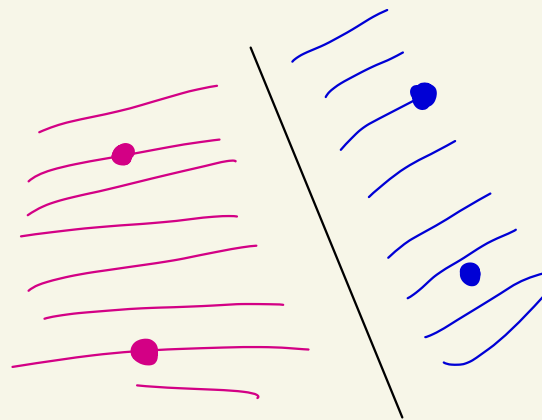
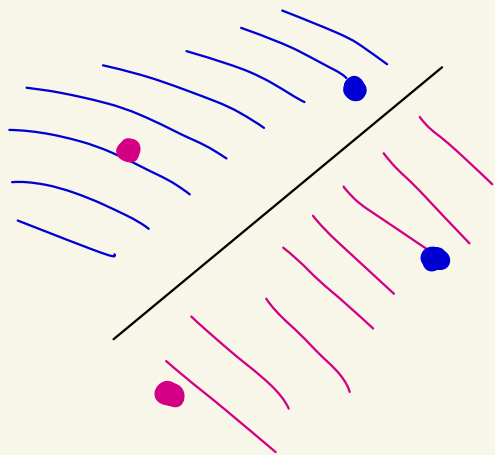


Prob de ser azul 0.2

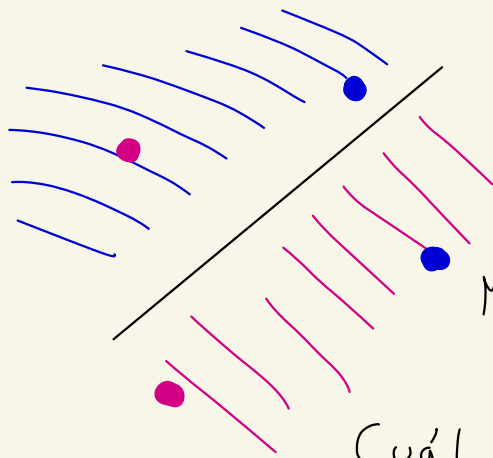
Aumenta en esta  dirección

Prob de ser rojo 0.8

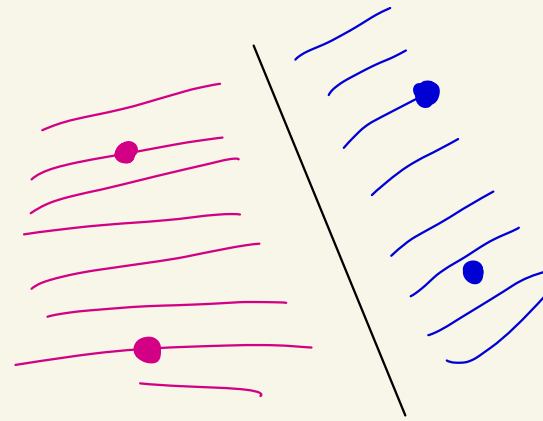
Aumenta en esta  dirección



Cuál modelo es mejor?
Cómo determinarlo matemáticamente?



Modelo 1

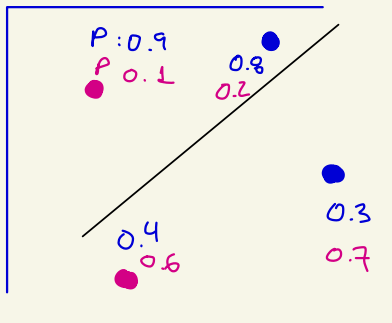


Modelo 2

Cuál modelo es mejor?

(cómo determinarlo matemáticamente? Probabilidad)

Lado azul

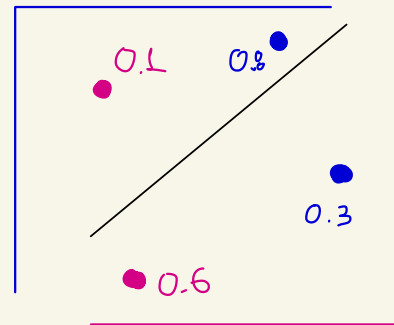


Lado rojo

Cuál es la prop. de tener esta configuración de acuerdo al modelo 1

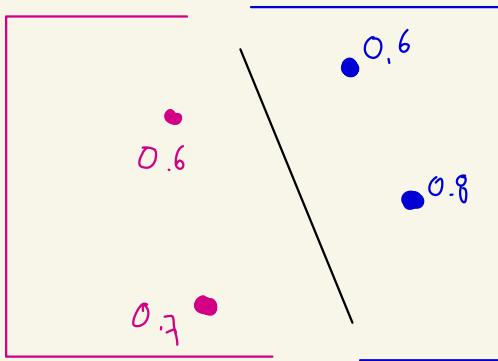
$$0.1 \times 0.8 \times 0.6 \times 0.3 = 0.0144$$

Lado azul



Lado rojo

Ahora calculamos para el modelo 2



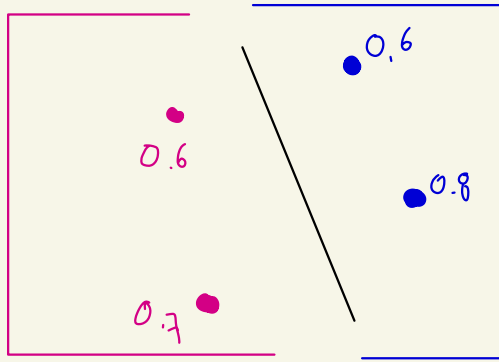
$$0.6 \times 0.7 \times 0.6 \times 0.8$$

$$0.2$$

Mayor que el modelo 1

Quisiéramos maximizar este número

Ahora calculamos para el modelo 2



$$0.6 \times 0.7 \times 0.6 \times 0.8$$

$$0.2$$

Mayor que el modelo 1

Mejor maximizar sumas que productos

Quisiéramos maximizar este número

$$\text{Maximizamos } \ln(0.6 \times 0.7 \times 0.6 \times 0.8) = \ln(0.6) + \ln(0.7) + \ln(0.6) + \ln(0.8)$$

$$\approx \text{Minimizamos } -\ln(\quad) = -\ln\boxed{} - \dots - \ln\boxed{}$$

$$\text{Cross-entropy} = - \sum_{i=1}^m y_i \ln(p_i) + (1-y_i) \ln(1-p_i)$$



función a minimizar