Scenario:- A telecomunications Company is analyzing it's Customer data to understand the factors Influencing Customer churn (i.e: weather a Customer discontinues their Services). The've Identified two factors: Monthly Data usage (GB) and Customer Service Calls (Number)

X_1	X_2	Y
Monthly data usage (GB)	Customer Service Calls (Num)	Churn (1, 0)
10	1	0
25	3	1
15	0	0
5	4	1
20	2	0

(b) $\left((X^T * X) \right)^{-1} . X^T) Y$

$X \Rightarrow \begin{bmatrix} 1 & 10 & 1 \\ 1 & 25 & 3 \\ 1 & 15 & 0 \\ 1 & 5 & 4 \\ 1 & 20 & 2 \end{bmatrix}$

$\log (odds) :- \boxed{\begin{array}{l} B_0 :- 3.5 \\ B_1 :- 0.2 \\ B_2 :- 0.8 \end{array}}$

Predicting Churn for new Customer:

X_1 Monthly data usage (GB)	X_2 Customer Service (Num)	Y Churn (0,1)
18	3	

$$\log(\text{odds}) = \beta_0 + \beta_1(x_i)$$

$$\frac{1}{1 + e^{-(\beta_0 + \beta_1 x_1 + \beta_2 * x_2)}}$$

$$\Rightarrow \frac{1}{1 + e^{-(3.5 + 0.2*18 + 0.8*3)}}$$

$$\Rightarrow \frac{1}{1 + e^{-2.5}}$$

$$\Rightarrow \quad \text{(B)} \quad = 0.92$$

$$\Rightarrow 1$$

Q1:- Calculate Log(odds) and Probability of Customer 2

$$Y = \cfrac{1}{1 + e^{-(a_0 + a_1 x_1 + a_2 x_2)}}$$

$$Y = \cfrac{1}{1 + e^{-(3.5 + 0.2 \times 25 + 0.8 \times 3)}}$$

$$Y = \cfrac{1}{1 + e^{-3.9}}$$

$$Y = \cfrac{1}{1 + e^{-3.9}} = 0.98$$