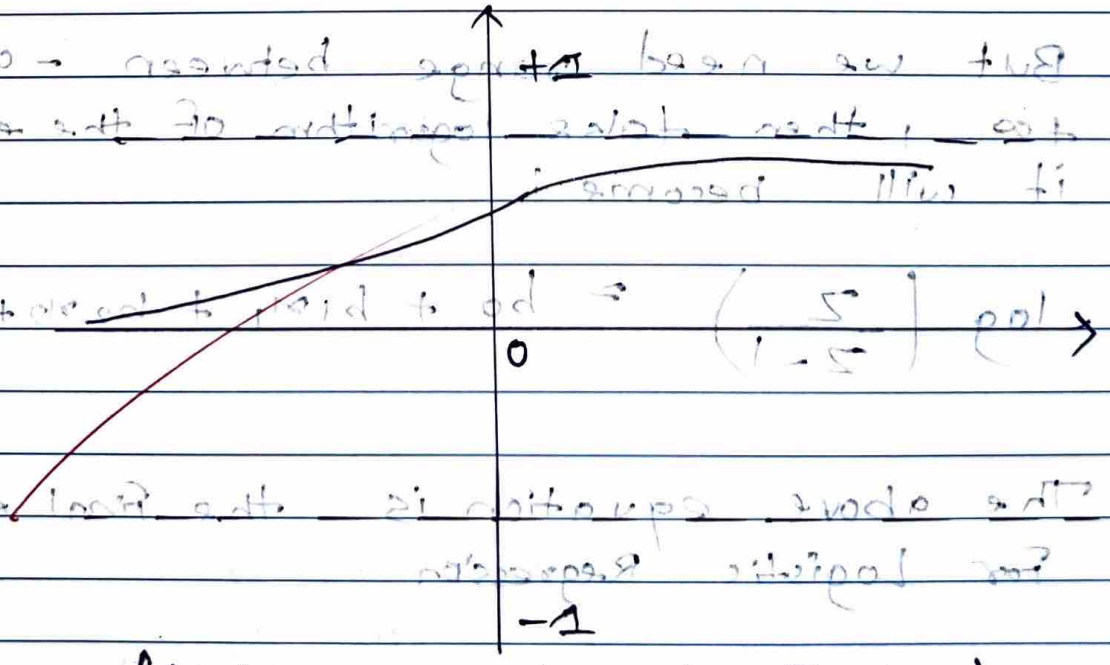
THADOMAL SHAHANI TSEC ENGINEERING COLLEGE

Experiment NO: 4

Aim: Implement logistic regression using ML method without using SKLearn.

Theory:

- Logistic regression is a supervised learning algorithm used for classification tasks where the goal is to predict the probability that an instance belongs to a given class or not.
- Logistic regression is a statistic algorithm which analyze the relationship between the two data factors.
- Logistic regression is used for binary classification where we use sigmoid function, that takes input as independent variables and produces a probability value between 0 and 1.



(Logistic or sigmoid Function)

- The net input to the sigmoid function is,

$$Z = b_0 + b_1 x_1 + b_2 x_2 + \ldots + b_n x_n$$

- In the net input equation x represents the input data or the features.
- When we use optimized coefficients b, classifier will be successful.
- Optimized b can be calculated using the optimization technique/concepts.
- In logistic regression Z can be between 0 and 1 only, so for this let's divide the above equation by $(Z-1)$.

$\frac{Z}{Z-1}$ is 0 for $Z = 0$ and infinite for $Z = 1$

- But we need range between $-\infty$ to $+\infty$, then take logarithm of the equation it will become:

$$\log\left(\frac{Z}{Z-1}\right) = b_0 + b_1 x_1 + b_2 x_2 + \ldots + b_n x_n$$

- The above equation is the final equation for Logistic Regression.

27/9/24