Logistic Regression: Example 2

Que: To predict whether a student will pass (1) or fail (0) based on # hours slept and study hours for the given model parameters b1, b2 and a using Logistic Regression;

Sr No	Slept	Study	Result
1	7.23	5.55	0
2	8.12	5.12	1
3	9.23	6.23	0
4	5.12	8.12	1
5	9.23	6.23	0
6	3.55	9.55	1
7	4.32	8.32	1

Given model parameters b0 = -1.523
b1 = -1.2
b2 = 1.012

Answer: IV is Independent variable and DV is Dependent variable

IV IV DV e = 2.71828

Sr No	Slept (x1)	Study (x2)	Result (y)	Calcuated Y (Fitted Value)	Prediction
1	7.23	5.55	0	0.0101	0
2	8.12	5.12	1	0.0023	0
3	9.23	6.23	0	0.0018	0
4	5.12	8.12	1	0.6342	1
5	9.23	6.23	0	0.0018	0
6	3.55	9.55	1	0.9798	1
7	4.32	8.32	1	0.8472	1

Determine Predicted value of y: Result = Pass = 1 i.e P(y=1) and Result = Fail = 0 i.e P(y=0)

$f(z) = P(\text{Result}) = 1 / (1 + e^{-(b0+b1*\text{Slept}+b2*\text{Study})})$

C' Matrix	Predicted 1	Predicted 0
Actual 1	TP	FN
Actual 0	FP	TN

C' Matrix	Predicted 1	Predicted 0	Total (N)
Actual 1	3	1	4
Actual 0	0	3	3
Total (N)	3	4	**7**

P, Precision or PPV =	TP / (TP+FP)=	1.000
NPV =	TN / (TN+FN)=	0.750
False Omission Rate (FOR) =	1 - NPV=	0.250
R, Recall (Sensitivity) or TPR =	TP / (TP+FN)=	0.750
Specificity or NPV or TNR =	TN / (TN+FP)=	1.000
False Positive Rate (FPR) =	FP / (FP+TN)=	0.000
False Negative Rate (FNR) =	FN / (FN+TP)=	0.250
Accuracy =	(TP+TN)/(TP+TN+FP+FN)=	0.857
F1 score =	2 * P * R / (P + R)=	0.8571428571