NOTES

Date: 03-02-25 (S) M T W T F S

Title: 4.8 Question 6 Part A

Suppose X_1 = hours studied

X_2 = undergrad GPA

Y = receive an A

Where $\hat{\beta}_0 = -6$, $\hat{\beta}_1 = 0.05$, $\hat{\beta}_2 = 1$

$$\hat{p}(x) = \frac{e^{-6 + 0.05X_1 + 1X_2}}{1 + e^{-6 + 0.05X_1 + 1X_2}}$$

when $X_1 = 40$, $X_2 = 3.5$

$$\hat{p}(x) = \frac{e^{-6 + 0.05(40) + 3.5}}{1 + e^{-6 + 0.05(40) + 3.5}} = 0.377540669$$

Logistic regression

$$p(x) = \frac{e^{\beta_0 + \beta_1 x}}{1 + e^{\beta_0 + \beta_1 x}}$$

NOTES

Date: 03-02-25 S M T W T F S

Title: 4.8 Question 6 Part B

when $x_2 = 3.5$ and $\hat{p}(x) = 0.5$

$p(x) = \frac{e^{\beta_0 + \beta_1 x_2 + \beta_2 x_2}}{1 + e^{\beta_0 + \beta_1 x_1 + \beta_2 x_2}}$ is equivalent to $\frac{p(x)}{1 - p(x)} = e^{\beta_0 + \beta_1 x_1 + \beta_2 x_2}$

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

$$\frac{0.5}{1 - 0.5} = e^{-6 + 0.05 x_1 + (1) 3.5}$$

$$1 = e^{-2.5 + 0.05 x_1}$$

$$\ln 1 = \ln e^{-2.5 + 0.05 x_1}$$

$$0 = -2.5 + 0.05 x_1$$

$$2.5 = 0.05 x_1$$

$$x_1 = 50$$

50 hours are need to have a 50% chance of getting an A