Question 3:

a.) $L(B_0, B_1) = \pi [P(Y_i = 1)^{y}] \times [P(Y_i = 0)^{1-y}]$

π represents the product overa all observations $(i = 1 \text{ to } 4)$

; $P(y_i = 1)$ is the probability of Y_i being 1.

$\hookrightarrow P(Y_i = 1) = \frac{1}{1+e^{-(B_0 + B_1 \times X_1)}}$

Likelihood function

$\hookrightarrow L(B_0, B_1) = \pi [P(Y_i = 1)^{y_i}] \times [P(y_i = 0)^{1-y}]$

b.) $\log_{B_1} \} (L(B_0) = \sum_i [y_i \times \log(P(Y_i = 1)) + (1 - y_i) \times \log(1 - P(Y_i = 1))]$

$\sum_i$ represents the sum over all observations

a. Likelihood function:

$L(B_0, B_1) = \left(\frac{1}{1+e^{-(B_0 + B_1 x_4)}}\right) \times \left(\frac{1}{1+e^{-(B_0 + B_1 x_3)}}\right) \times$

$\left(\frac{1}{1+e^{-(B_0 + B_1 x_2)}}\right) \times \left(\frac{1}{1+e^{-(B_0 + B_1 x_1)}}\right)$

b. likelihood functions:

$\log_{B_1} \} (L(B_0) = \log\left(\left(\frac{1}{1+e^{(B_0 + B_1 x_4)}}\right) \times \left(\frac{1}{1+e^{(B_0 + B_1 x_3)}}\right)\right.$

$\left. \times \left(1 - \frac{1}{1+e^{(B_0 + B_1 x_2)}}\right) \times \left(1 - \frac{1}{1+e^{(B_0 + B_1 x_1)}}\right)\right)$