Question #1

X_1 = hours studied

X_2 = undergrad GPA

Y = receive an A

$$p(X) = \frac{e^{(B_0 + B_1 X_1 + B_2 X_2)}}{(1 + e^{(B_0 + B_1 X_1 + B_2 X_2)})}$$

$\Rightarrow$

- $\hat{B}_0 = -6$
- $\hat{B}_1 = 0.05$
- $\hat{B}_2 = 1$

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

a) $X_1 = 40$ hours
$X_2 = 3.5$ GPA

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

$$= \frac{e^{(-0.5)}}{(1 + e^{(-0.5)})} = 0.3775 = 37.75\%$$

probability to receive an A.

b) $X_1 = X_1$ hours
$X_2 = 3.5$ GPA
$p(X) = 50\% = 0.5$

$$\Rightarrow 0.5 = \frac{e^{(-6 + 0.05 X_1 + 3.5)}}{(1 + e^{(-6 + 0.05 X_1 + 3.5)})}$$

$$\Rightarrow 0.5 (1 + e^{(-2.5 + 0.05 X_1)}) = e^{(-2.5 + 0.05 X_1)}$$

$$\Rightarrow 0.5 = 0.5 (e^{-2.5 + 0.05 X_1})$$

$$\Rightarrow \log(1) = -2.5 + 0.05 X_1$$

$$\Rightarrow X_1 = \frac{2.5}{0.05} = 50 \text{ hours}$$

needed to study for 50% chance of A.