

Q. 4.2.d

Set derivative to 0 to find max. likelihood.

$$\frac{\partial \ln(P)}{\partial p} = 0 + \frac{\sum_{i=1}^{10} n_i}{\hat{p}} - \frac{10}{1-\hat{p}}$$

$$\frac{10}{1-\hat{p}} = \frac{k}{\hat{p}} \quad (k = \text{total heads received in experiment})$$

From data, $k = 3 + 2 + 6 + 4 + 6$
 $k = 21$

$$10 \hat{p} = 21 (1-\hat{p})$$

$$10 \hat{p} = 21 - 21 \hat{p}$$

$$31 \hat{p} = 21$$

$$\hat{p} = \frac{21}{31} = \underline{\underline{0.6774}}$$

This gives us the max. likelihood of observing this data.

In general,

$$\hat{p} = \frac{\text{Total number of heads}}{\text{Total number of flips}}$$