

Assignment 10

Pradeep Mundlik (AI21BTECH11022)

June 5, 2022

Outline

1 Question

2 Solution

Question

Papoulis 8.10

Among 4000 newborns, 2080 are male. Find the 0.99 confidence interval of the probability $p = P\{\text{male}\}$.

Solution

The joint density

$$f(X, c) = c^n e^{-cn(\bar{x} - x_0)} \dots x_i > x_0 \quad (1)$$

has an interior maximum if

$$\frac{df(X, c)}{dc} = 0 \quad (2)$$

$$\implies \hat{c} = \frac{1}{\bar{x} - x_0} \quad (3)$$

Now, we have

$$\bar{x} = 2080/4000 = 0.52 \quad (4)$$

$$n = 4000 \quad (5)$$

$$z_u \simeq 2.326 \quad (6)$$

$$P_{1,2} \simeq \bar{x} \pm z_u \sqrt{\frac{\bar{x}(1 - \bar{x})}{n}} = 0.52 \pm 0.018 \quad (7)$$

$$\Rightarrow 0.502 < p < 0.538 \quad (8)$$