Assignment 9

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Question : EX 8.22

The time to failure of a bulb is a random variable x with density $ce^{-cx}U(x)$. We test 80 bulbs and find that 200 hours later, 62 of them are still good. Find the ML estimate of c.

Solution

The probability

$$p = 1 - F_x(200) = e^{-200c}$$

of the event $\{x > 200\}$ is a monotonic function of c.

To find the ML estimate $\hat{c}$ of c it suffices to find the ML estimate $\hat{p}$ of p. From the question , it follows

$$k = 62$$
$$n = 80$$

Then ,

$$\hat{p} = \frac{62}{80} = 0.775 \tag{1}$$

$$\hat{c} = -\frac{ln\hat{p}}{200} = 0.0013 \tag{2}$$

$\therefore$ The ML estimate of c i.e, $\hat{c} = 0.0013$