

Assignment 8

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Question:

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 $X \geq 200$ is a monotone decreasing function of c . To find the ML estimate \hat{c} of c it suffices to find the ML estimate \hat{p} of p .

$$\hat{p} = \frac{62}{80} = 0.775 \quad (1)$$

$$p = e^{-200c} \quad (2)$$

$$\ln(p) = -200c \quad (3)$$

$$\implies c = -\frac{1}{200}\ln(\hat{p}) \quad (4)$$

$$c = 0.0013 \quad (5)$$