LAB 6 - RELIABILITY

A2QF]

Exponentially distributed data

PDF: $f(t) = \lambda e^{-\lambda t}$

CDF: $F(t) = 1 - e^{-\lambda t}$

RELIABILITY: $R(t) = 1 - F(t) = e^{-\lambda t}$

HAZARD: $z(t) = \frac{\lambda}{R(t)} = \lambda$

lambda_est: 0.2036

① PDF

$f(t) = \boxed{\lambda e^{-\lambda t}}$

② CDF

$$\int_0^t \lambda e^{-\lambda t}\, dt =$$

$$= \lambda \cdot \int_0^t e^{-\lambda t}\, dt =$$

$$= \lambda \cdot \left[-\frac{e^{-\lambda t}}{\lambda} \right]_0^t$$

$$= \lambda \cdot \left[-\frac{e^{-\lambda t}}{\lambda} + \frac{1}{\lambda} \right]$$

$$= -\frac{e^{-\lambda t} \cdot \cancel{\lambda}}{\cancel{\lambda}} + \frac{\cancel{\lambda}}{\cancel{\lambda}}$$

$$= -e^{-\lambda t} + 1$$

$$\circlearrowleft = \boxed{1 - e^{-\lambda t}}$$

③ RELIABILITY

$R(t) = 1 - F(t)$

$= 1 - 1 - e^{-\lambda t}$

$= \boxed{e^{-\lambda t}}$

④ HAZARD

$z(t) = \frac{f(t)}{R(t)}$

$= \frac{\lambda \cancel{e^{-\lambda t}}}{\cancel{e^{-\lambda t}}}$

$= \boxed{\lambda}$