

# 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

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

② CDF

$$\begin{aligned} \int_0^t \lambda e^{-\lambda t} dt &= \\ &= \lambda \cdot \int_0^t e^{-\lambda t} dt = \\ &= \lambda \cdot \left[ -\frac{e^{-\lambda t}}{\lambda} \right]_0^t \\ &= \lambda \cdot \left[ -\frac{e^{-\lambda t}}{\lambda} + \frac{1}{\lambda} \right] \\ &= -\frac{e^{-\lambda t} \cdot \cancel{\lambda}}{\cancel{\lambda}} + \frac{\cancel{\lambda}}{\cancel{\lambda}} \\ &= -e^{-\lambda t} + 1 \end{aligned}$$

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

③ RELIABILITY

$$\begin{aligned} R(t) &= 1 - F(t) \\ &= 1 - 1 - e^{-\lambda t} \\ &= e^{-\lambda t} \end{aligned}$$

④ HAZARD

$$\begin{aligned} z(t) &= \frac{f(t)}{R(t)} \\ &= \frac{\lambda \cancel{e^{-\lambda t}}}{\cancel{e^{-\lambda t}}} \\ &= \lambda \end{aligned}$$