→ Hazard rate/function

$$h(x) = \frac{f(x)}{S(t)}$$

⟶ It's not a probability ⟹ $h(x) \geq 0$

$$= \frac{-\frac{d}{dx} S_x}{S_x}$$

$$= -\frac{d}{dx} \ln(S(x))$$

→ Interpretation → pdf evaluated at x, adjusted by the likelihood that the RV is greater than x

⟹ measures the likelihood of the RV at x by inflating the pdf as the RV becomes less likely to exceed x

→ Simply stated → hazard rate is how likely it is for something to fail)

⟶ increasing $h(x)$ ⟹ more likely to fail the older it gets

decreasing — — ⟹ less — — — — —

constant — — ⟹ likely to fail at any point in time

→ Cumulative Hazard function

$$H(x) = \int_{-\infty}^{x} h(t)\, dt$$

$$= \int_{-\infty}^{x} -\frac{d}{dt} \ln(S(t))\, dt$$

$$= -\ln(S(x))$$

$$\Rightarrow \quad S(x) = e^{-H(x)}$$