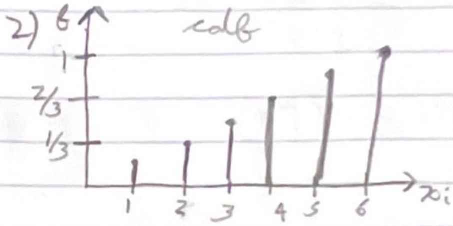
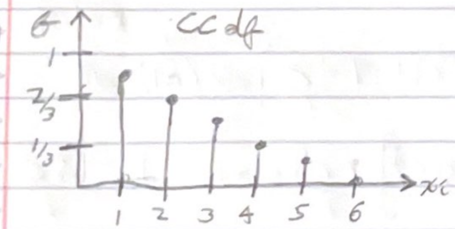
HW #14

Risk can only exist when:

1) there is uncertainty,
2) anonymity of the victims,
3) prediction before realization, and
4) there is meta-uncertainty about risk.

1) 

2) 

3) 

pdf - the relative frequency of obtaining each outcome x_i.

cdf - the frequency of obtaining any outcome & the previous outcomes: $x_i, x_{i-1}, x_{i-2} \ldots$

ccdf - the frequency of not obtaining the current or any previous outcomes: x_i, x_{i-1}, x_{i+1}

HW#1A

$f = \lambda \exp(-\lambda t)$

1) assume a constant probability failure rate $\frac{df}{dt} = C g(t)$

$\Rightarrow f = C \int g(t)\,dt$, but failure rate is constant, so

$\frac{\frac{df}{dt}}{f} = \frac{C g(t)}{C\int g(t)\,dt}$ = constant $\therefore \frac{g(t)}{\int g(t)\,dt}$ = constant, so $g(t)$ is an exponential

$\therefore g(t) = \exp(-\theta t)$ & $f = C\exp(\theta t)$ & $\frac{df}{dt} = C\theta\exp(\theta t)$

assuming a probability density function for f implies $\int_0^\infty f(t)\,dt = 1$

$E = |\theta|$

$\therefore \theta < 0$, so $\int$ isn't divergent $\Rightarrow \int_0^\infty f(t)\,dt = 1 = C\int_0^\infty \exp(-Et)\,dt$

$\Rightarrow C\left[\frac{-\exp(-Et)}{E}\right]_0^\infty = \frac{C}{E}\left[-\exp(-\infty) + \exp(0)\right] = \frac{C}{E}[0+1] = 1 \quad \therefore \frac{C}{E} = 1 \Rightarrow C = E$

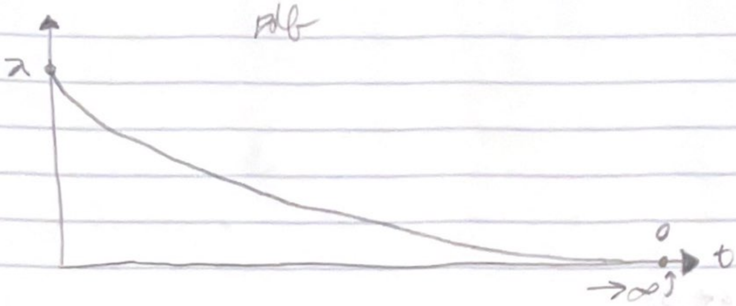
& $f = C\exp(-Et) \Rightarrow \underline{f = C\exp(-Ct)}$

know failures occur w/ a constant rate of λ, failure, so-

$\therefore \frac{\frac{df}{dt}}{f} = -\lambda = \frac{-C^2\exp(-Ct)}{C\exp(-Ct)} \Rightarrow \underline{\lambda = C}$

$$\boxed{\therefore \text{pdf} \Rightarrow f(t) = \lambda\exp(-\lambda t)}$$

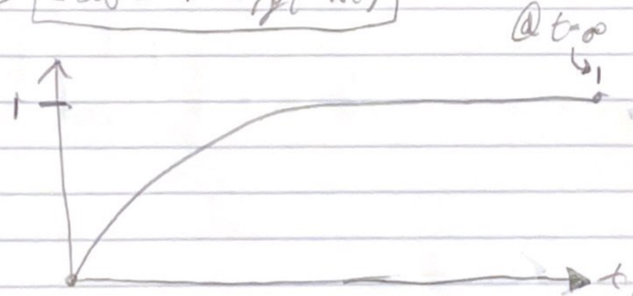
HW#1A



2) the cumulative distribution function is the total chance events will occur until a given point, which can be represented w/ an integral

$$cdf = \int_0^t \lambda \exp(-\lambda t)\, dt = \lambda\left[-\frac{1}{\lambda}\exp(-\lambda t)\right]_0^t = -\frac{\lambda}{\lambda}\left[\exp(-\lambda t) - \exp(0)\right]$$

$$\Rightarrow \boxed{cdf = 1 - \exp(-\lambda t)}$$



pdf - represents the chance an event happens @ one time, but meaningless physically because nothing is instant

cdf - chance an event has occurred by time t

ccdf - chance an event has not occurred by time t

3) $ccdf = 1 - cdf = \exp(-\lambda t)$