Continuous Random Variables

Δ = uncountably infinite

$[0,1]$

$[a,b]$

length
time
area
volume

Discrete

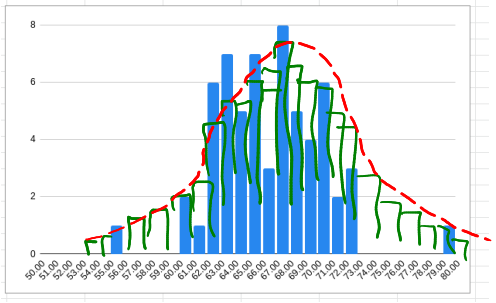
Δ — finite ← probability "computed" using rules of probability through some formula.

Δ — countably infinite ← probability "assigned"

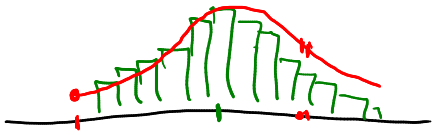
$X \sim \text{Poisson}(\lambda)$

$P(X=k) = e^{-\lambda}\frac{\lambda^k}{k!}$ ← ?

Histogram of heights of this class



Histogram of weights of this class ⟸ Modelling



Weights
Count? Measure?

Height R.V ⟶ Empirical Distribution
↓
Histogram
↓
Approximating Function
Approximating Density

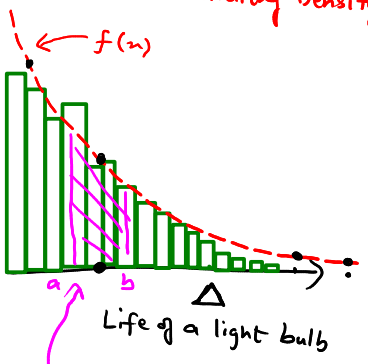
① $f(x) \geq 0$

② $\int_{-\infty}^{\infty} f(x)\,dx = 1$

⟸ Probability Density Function of a continuous r.v.

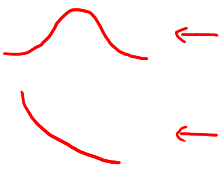
$f(x)$ can be > 1.

$\Delta = \{0 \text{ to infinity}\}$
Continuous

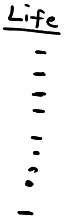


Life of a light bulb

Next time



Life



$0 <$ purple area < 1

can represent prob.

$P(a < X < b) = \int_a^b f(x)\,dx$

P(light bulb working between a & b hours)