CONTINUOUS RV:

PMF → PDF

Condition

$f(x) \geq 0 \quad \forall x \in S \longrightarrow f(x) \geq 0 \quad \forall x \in \mathbb{R}$

$\sum_{x \in S} f(x) = 1 \longrightarrow \int_{\mathbb{R}} f(x)\,dx$

Expectation

$E(u(X)) = \sum_{x \in S} u(x) f(x) \longrightarrow \int_{\mathbb{R}} u(x) f(x)\,dx$

$M_X(t) = \sum_{x \in S} e^{xt} f(x) \longrightarrow \int_{\mathbb{R}} e^{xt} f(x)\,dx$

CDF.

$F(x) = P(X \leq x) = \int_{-\infty}^{x} f(t)\,dt$

definition

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

$P(X \in [a,b]) = P(a \leq X \leq b) = F(b) - F(a)$

UNIFORM

$\int_a^b f(x)\,dx = 1 \quad$ and $f(x) = c$

$\int_a^b c\,dx = [cx]_a^b = c(b-a)$

$\Rightarrow c = \frac{1}{b-a}$

$\Rightarrow f(x) = \frac{1}{b-a} \quad a \leq x \leq b$

EXPONENTIAL & GAMMA

$\frac{109.6}{48} = 2.3$ scores / minute

$W \sim \text{Exponential}(\beta = 0.43)$

$E(W) = 0.43$