SPRING 2019

TEXAS
The University of Texas at Austin

CE 311S : PROBABILITY AND STATISTICS

Discussion session

F 2:00 – 3:00 PM

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Usual Details

- Reading response due Monday 7:00 AM
- Homework 3 due after spring break
- Mid-semester teaching evaluation over the weekend
- Office hours W 4:00 PM – 5:00 PM ECJ 6.406 or by appt

Name of special distribution (X)	**Properties**	**What X represents and its range (R_X)**	**Parameters**	**PDF** $f(x)$	**CDF** $F(x)$	**Expected value** $E(X)$	**Variance** $Var(X)$
Uniform distribution	○ Identical density (probability) for any value between *a* and *b*	R_X: $[a, b]$	a, b	$\begin{cases} \frac{1}{b-a} & \text{for } x \in [a,b] \\ 0 \text{ otherwise} \end{cases}$	$\begin{cases} \frac{x-a}{b-a} & \text{for } x \in [a,b) \\ 0 \text{ otherwise} \end{cases}$	$\frac{1}{2}(a+b)$	$\frac{1}{12}(b-a)$
Gamma distribution special cases: exponential chi-squared	○ α determines the shape ○ λ determines the scale ○ $\alpha=1$ is the exponential distribution ○ Exponential distribution is memoryless ○ *n* exponentials with λ is gamma ○ For *v* degrees of freedom, $\alpha=v/2$ and $\lambda=1/2$ is the chi-squared distribution	Total time waited for α events occurring with rate λ R_X: $[0, \infty)$	α, λ	$\frac{1}{\Gamma(\alpha)}\lambda^{\alpha}x^{\alpha-1}e^{-\lambda x}$ Exponential PDF $\lambda e^{-\lambda x}$	Involves another special function we haven't learned Exponential CDF $1 - e^{-\lambda x}$	$\frac{\alpha}{\lambda}$	$\frac{\alpha}{\lambda^2}$
Normal distribution (aka Gaussian)	○ Bell-shaped ○ μ determines the center ○ σ determines width	R_X: $(-\infty, \infty)$	μ, σ	$\frac{1}{\sigma\sqrt{2\pi}}\exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right)$	No closed-form solution (No neat formula)	μ	σ^2