Review - Continuous Random Variables

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Continuous Random Variables

- A RV X is *continuous* if its range is
- A RV X is *continuous* if its CDF is

Let X be a continuous RV and let a, b be real numbers with $a < b$.

- $P(X = a) =$
- In terms of the CDF, $P(a \leq X \leq b) =$
- True or False, $P(X \leq a) = P(X < a)$

Probability Density Functions

We say that $f(x)$ is a valid PMF if

1.
2.

How do you find $P(a \leq X \leq b)$ using the PDF?

How do you find the CDF from a PDF?

How do you find the PDF from a CDF?

Expected Values and Variance

- $E(X) =$
- $E(g(X)) =$

Continuous Random Variables

The Uniform RV

Let $X \sim U(a, b)$ what is the

- PDF of X
- CDF of X
- Expected value of X
- Variance of X

Give the 4 quantites above when $X \sim U(0, 1)$

The Exponential RV

Let $X \sim Exp(\lambda)$ what is the

- PDF of X
- CDF of X
- Expected value of X

- Variance of X

If X is Exponentially distributed, what is the distribution of aX? Can you show this using the CDF?

Lack of Memory Property: Let s and t be real numbers with $s < t$.

$$P(X > t | X > s) =$$

Normal Distributions and Related Concepts

Let $X \sim N(\mu, \sigma^2)$. Give the PDF, mean and variance of X.

What is the "Standard Normal" distribution?

Give the formula for "standardizing" a random variable. $Z =$

If Z is standard normal, how do you "unstandardize" it? $X =$

Recall that $P(Z \leq z) = \Phi(z)$ where $\Phi(z)$ can be found using a lookup table.

- If $X \sim N(\mu, \sigma^2)$, then $P(X \leq x) =$
- If $Y \sim LogN(\theta, \omega)$, then $P(X \leq x) =$
- If $X \sim Binom(n, p)$, then $P(X \leq x) \approx$ What conditions need to hold for this approximation to be decent?
- If $X \sim Poisson(\lambda)$, then $P(X \leq x) \approx$ What conditions need to hold for this approximation to be decent?