STAT 320: Principles of Probability
Unit 2: A Few Counting Principles & and Their Applications

United Arab Emirates University

Department of Statistics

Reminder: The Cumulative Distribution Functions

Distribution Functions

Definition (Cumulative Distribution Function (cdf))

The **cumulative distribution function** or **cdf** of a *any* variable X, denoted by $F_X(x)$, is defined by

$$F_X(x) = P(X \leq x) \text{ for all } x \in \mathbb{R}.$$

CDF: Example

Consider the experiment of tossing three fair coins, and let X = number of heads observed. We have already seen that

x	0	1	2	3
$p_X(x)$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

The cdf of X is:

$$F_X(x) = \begin{cases} 0 & \text{if } -\infty < x < 0 \\ \frac{1}{8} & \text{if } 0 \leq x < 1 \\ \frac{4}{8} & \text{if } 1 \leq x < 2 \\ \frac{7}{8} & \text{if } 2 \leq x < 3 \\ 1 & \text{if } 3 \leq x < \infty \end{cases}$$

Outline

1 Continuous Random Variables

2 A Few Widely Used Continuous Probability Distributions

3 Moment Generating Function

4 Moment Generating Function

Continuous Random Variables

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Simulations

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Moment Generating Function

Binomial and Multinomial Coefficient

Questions?