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

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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

$$F_X(x) = P(X \le x)$$
 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

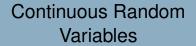
Х	0	1	2	3
$p_{x}(x)$	1 8	ന∣യ	3 	1 8

The cdf of X is:

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

### Outline

- Continuous Random Variables

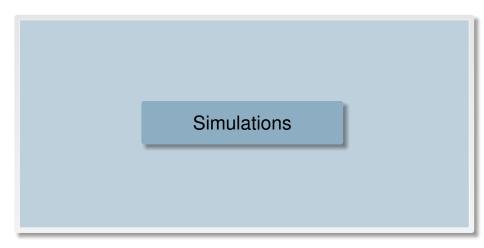


## Outline

- A Few Widely Used Continuous Probability Distributions

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- Continuous Random Variables
- A Few Widely Used Continuous Probability Distributions
- Moment Generating Function
- Moment Generating Function



## Outline

- **Moment Generating Function**

Moment Generating Function

Binomial and Multinomial Coefficient

