

# Lecture Slides



## *Essentials of Statistics* 5<sup>th</sup> Edition

and the Triola Statistics Series

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# Chapter 5

## Probability Distributions

5-1 Review and Preview

5-2 Probability Distributions

5-3 Binomial Probability Distributions

**5-4 Parameters for Binomial Distributions**

# Key Concept

In this section we consider important characteristics of a binomial distribution including center, variation and distribution. That is, given a particular binomial probability distribution we can find its mean, variance and standard deviation.

A strong emphasis is placed on **interpreting** and **understanding** those values.

# Binomial Distribution: Formulas

**Mean**  $\mu = n \cdot p$

**Variance**  $\sigma^2 = n \cdot p \cdot q$

**Std. Dev.**  $\sigma = \sqrt{n \cdot p \cdot q}$

Where

$n$  = number of fixed trials

$p$  = probability of **success** in one of the  $n$  trials

$q$  = probability of **failure** in one of the  $n$  trials

# Interpretation of Results

It is especially important to interpret results. The **range rule of thumb** suggests that values are unusual if they lie outside of these limits:

$$\text{maximum usual value} = \mu + 2\sigma$$

$$\text{minimum usual value} = \mu - 2\sigma$$

# Example

McDonald's has a 95% recognition rate. A special focus group consists of 12 randomly selected adults.

For such a group, find the mean and standard deviation.

$$\mu = np = 12(0.95) = 11.4$$

$$\sigma = \sqrt{npq} = \sqrt{12(0.95)(0.05)} = 0.754983 = 0.8 \text{ (rounded)}$$

# Example - continued

Use the range rule of thumb to find the minimum and maximum usual number of people who would recognize McDonald's.

$$\mu + 2\sigma = 11.4 + 2(0.8) = 13 \text{ people}$$

$$\mu - 2\sigma = 11.4 - 2(0.8) = 9.8 \text{ people}$$

If a particular group of 12 people had all 12 recognize the brand name of McDonald's, that would **not** be unusual.