Sampling Distribution Models

AP STATISTICS CHAPTER 17

Statistics is the art of stating in precise terms that which one does not know.

William H. Kruskal (1919 - 2005)



Notice what happens to the shape, center, and spread of the histogram as the sample size increases:

- Shape approaches Normal
- Mean of distribution of sample proportions is approximately true proportion
- Standard deviation of distribution of sample proportions narrows

Central Limit Theorem

This *amazing* result says that for proportions, the <u>Sampling Distribution Model</u> is *approximately* Normal for large *n* (assuming observations are independent).



Assumptions and Conditions

Assumptions for CLT for Proportions

- 1. Sample is a simple random sample (SRS)
- 2. Sample values are independent
- 3. Sample size is large

Conditions Check

- 1. Maybe not ... is sample unbiased and representative?
- 2. No (sample w/o replacement) -- Is sample less than 10% of population?
- 3. Are *np* > 10 and *nq* > 10 ?



Of all cars on I-35, it is estimated that 80% exceed the speed limit. What proportion of speeders might we see among the next 50 cars?

Show that a Normal Model may be used and draw a picture of the model using the 68-95-99.7 Rule.



Suppose that 13% of the population is left-handed. A 200-seat auditorium has been built with 15 "lefty seats." In a class of 90 students, what is the probability that there will not be enough seats for the "lefties"?



In a bag of M&Ms, suppose that 15% are supposed to be red. In a particular large bag of 250 M&Ms, what is the probability that we get less than 12% red?



<u>Assignment 1</u> Read Chapter 17 (pp. 445-452) Ch 17 #1, 5, 11-15 odd, 19, 27



"In my thirty years of teaching statistics I've given exams to over 50,000 students. Now I travel free using frequent crier miles."

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