AP Statistics

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Chapter 7 Notes

G 22

SAMPLING DISTRIBUTION:		
Definition: The distribution of the statistic from every possible sample of size n.	Example: Proportion of students in band Sample Size: $n = 12$ Describe (what does one dot represent?): The proportion of sudents in band from a random sample of 12 harbor students.	Population: Harbor high students

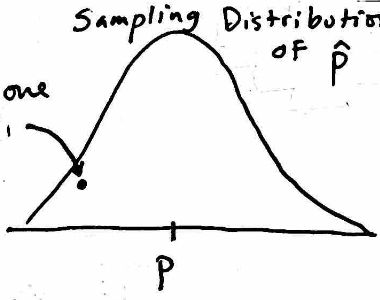
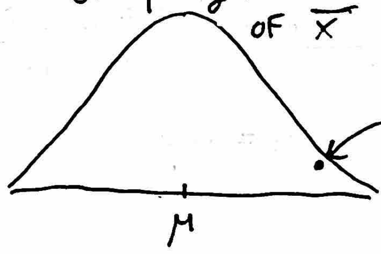
A number that describes the whole **population** is known as a parameter.

A number that is calculated from a **sample** is known as a statistic.

We always use a Statistic to estimate a parameter.

In Section 7.2, we used a sample proportion to estimate a population proportion.

In Section 7.3, we used a sample mean to estimate a population mean.

	Sample Proportions	Sample Means	SD
What is the parameter?	p	μ	σ
What is the statistic?	$\hat{p}$	$\bar{x}$	s
Draw Sampling Distribution. (if Normal)	$\hat{p}$ from one sample of size n. Sampling Distribution of $\hat{p}$ 	Sampling Distribution of $\bar{x}$  $\bar{x}$ from one sample of size n.	
When is the sampling distribution approximately normal?	Large Counts! $np \geq 10$, $n(1-p) \geq 10$	• Pop. Dist. is approx. Normal — OR — • C.L.T. → $n \geq 30$	
What is the mean of the sampling distribution?	$\mu_{\hat{p}} = p$	$\mu_{\bar{x}} = \mu$	

	Sample Proportions	Sample Means
What is the standard deviation of the sampling distribution?	$\sigma_{\hat{p}} = \sqrt{\dfrac{p(1-p)}{n}}$	$\sigma_{\bar{x}} = \dfrac{\sigma}{\sqrt{n}}$
What condition must be satisfied in order to use the above formula?	10% condition! $n \leq \frac{1}{10} N$	10% condition! $n \leq \frac{1}{10} N$
What is the formula for a z-score?	$z = \dfrac{\hat{p} - p}{\sqrt{\dfrac{p(1-p)}{n}}}$	$z = \dfrac{\bar{x} - \mu}{\dfrac{\sigma}{\sqrt{n}}}$

Old stuff from Chapter 6:

Binomial Distributions

B: BINARY! Outcomes can be categorized as "success" or "failure"

I: Independent OR "10% Condition"
one trial doesn't affect the next
$np \geq 10$ and $(n)(1-p) \geq 10$

N: Set NUMBER of trials.
$n =$ ___

S: SAME probability for all trials
$p =$ ___

Mean of a Binomial Distribution:

$\mu = np$

Standard Deviation of a Binomial Distribution:

$\sigma = \sqrt{np(1-p)}$

Shape of a Binomial Distribution (Normal if…):
Large Counts!

$np \geq 10$ AND $n(1-p) \geq 10$

Formula for Binomial Probabilities:

$P(x=k) = {}_nC_k \, (p)^k \, (1-p)^{(n-k)}$

$n =$ # of trials
$k =$ desired # of successes
$p =$ probability of success

COMBINATIONS
$\binom{n}{k}$ is same as ${}_nC_k$

The following situation might be tricky: $N = 152$
"Ms. Ramer will randomly choose 15 of her 152 students to attend the state math fair. Julian is hoping that he and a few of his friends will be chosen to go. (He considers 10 of Ms. Ramer's students to be his good friends.) Given that Julian is one of the chosen students, what is the probability that at least two of his friends will also be chosen."

If Julian is chosen, there are 14 more people to be chosen and 151 people to choose from.

Explain why this situation is a binomial probability setting:

B success = friend chosen
failure = not friend

I $(14)\left(\frac{10}{151}\right)$ is not ≥ 10 and $(14)\left(\frac{141}{151}\right) \geq 10$

N $n = 14$

S $p = \frac{10}{151}$

Whoops! Not Binomial because of independence.

$P(x \geq 2)$