AP Statistics, Chapter 7.1 & 7.2 **Name** Key
Practice Quiz

Suppose you have a population in which 60% of the people approve of gambling.

1. Is the value 0.60 a parameter or a statistic? Give appropriate notation for this value.

Parameter $p = .60$

You want to take many samples of size 10 from this population to observe how the sample proportion who approve of gambling varies in repeated samples.

2. Describe the design of a simulation using the partial random digits table below to estimate the sample proportion who approve of gambling. Then carry out **five** trials of your simulation.

Let digits 0-9 represent a response
1, 2, 3, 4, 5, 6 Approve
7, 8, 9, 0 Don't Approve

Sample										
	36009	19365	15412	39638	85453	46816				
1 → 6/10	38448	48789	18338	24697	39364	42006				
2 → 8/10	82739	57890	20807	47511	81676	55300				
3 → 8/10	60940	72024	17868	24943	61790	90656				
4 → 4/10	68417	35013	15529	72765	85089	57067				
5 → 6/10										

3. The sampling distribution of $\hat{p}$ is the distribution of $\hat{p}$ from all possible SRSs of size 10 from this population. What is the mean of this distribution? average $\hat{p}$ of all possible trials

$\mu_{\hat{p}} = .60$

4. If you used samples of size 20 instead of size 10, which sampling distribution would give you a better estimate of the true proportion of people who approve of gambling? Explain your answer.

Sample size of 20 because the larger the sample size the smaller the variability.

5. Choose an SRS of size n from a large population with population proportion p having some characteristic of interest. Let $\hat{p}$ be the proportion of the sample having that characteristic.

- What is the mean of the sampling distribution? $\mu_{\hat{p}} = p$
- What is the standard deviation of the sampling distribution? $\sigma_{\hat{p}} = \sqrt{\frac{pq}{n}}$ or $\sqrt{\frac{p(1-p)}{n}}$
- Under what conditions will the formula for the standard deviation of $\hat{p}$ be reasonably accurate?

10% condition: population is at least 10 x as large as sample size
$10(n) \leq$ population

- The sampling distribution of $\hat{p}$ is approximately Normal when the sample size n is "large." What conditions need to be met in order to use the Normal approximation to the sampling distribution of $\hat{p}$?

$np \geq 10$ $nq \geq 10$ or $n(1-p) \geq 10$

\# successes ≥ 10 \# of failures ≥ 10

* remember q is probability of failure $(1-p)$ *

Population

6. According to government data, 22% of American children under the age of 6 live in households with incomes less than the official poverty level. A study of learning in early childhood chooses an SRS of 300 children. What is the probability that more than 20% of the sample are from poverty households? (Remember to check that you can use the Normal approximation.)

$n=300$ $P(\hat{p} > .20)$

$\mu_{\hat{p}} = .20$ so $\sigma_{\hat{p}} = \sqrt{\frac{(.22)(.78)}{300}} = .0239$

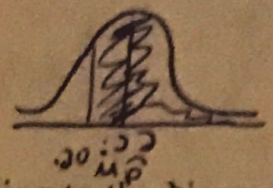
$N(.22, .0239)$

normcdf$(.2, \infty, .22, .0239)$

$\approx .7987$

① ✓ 10% Condition for $\sigma_{\hat{p}}$
$10(300) \leq$ Population
$3000 \leq$ Population
reasonable to assume

② ✓ Normal $np \geq 10$ $nq \geq 10$
$300(.22) \geq 10$ ✓ $300(.78) \geq 10$ ✓
∴ Approximately Normal



7. The weights of newborn children in the United States vary according to the Normal distribution with mean 7.5 pounds and standard deviation 1.25 pounds. The government classifies a newborn as having low birth weight if the weight is less than 5.5 pounds.

X = weight of newborn

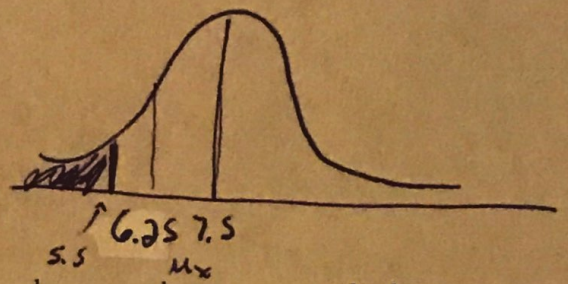
a) What is the probability that a baby chosen at random weighs less than 5.5 pounds at birth?

$N(7.5, 1.25)$ $P(X < 5.5)$

μ_x σ_x

normcdf$(-\infty, 5.5, 7.5, 1.25)$

$\approx .0548$



You choose three babies at random and compute their mean weight, $\bar{x}$.

b) What are the mean and standard deviation of the sampling distribution of the mean weight $\bar{x}$ of the three babies?