AP Statistics - Chapter 9 Test Form A
DO NOT WRITE ON THIS TEST SHEET

Part I – Multiple Choice: Circle the letter of the best answer on your answer sheet

1. A phone-in poll conducted by a newspaper reported that 73% of those who called in liked business tycoon Donald Trump. The number 73% is a

a statistic.
b sample.
c parameter.
d population.

2. The sampling distribution of a statistic is

a the probability that we obtain the statistic in repeated random samples.
b the mechanism that determines whether randomization was effective.
c the distribution of values taken by a statistic in all possible samples of the same size from the same population.
d the extent to which the sample results differ systematically from the truth.

3. A statistic is said to be unbiased if

a the survey used to obtain the statistic was designed so as to avoid even the hint of racial or sexual prejudice.
b the mean of its sampling distribution is equal to the true value of the parameter being estimated.
c both the person who calculated the statistic and the subjects whose responses make up the statistic were truthful.
d it is used for only honest purposes.

4. A simple random sample of 50 undergraduates at Johns Hopkins University found that 60% of those sampled felt that drinking was a problem among college students. A simple random sample of 50 undergraduates at Ohio State University found that 70% felt that drinking was a problem among college students. The number of undergraduates at Johns Hopkins University is approximately 2000, while the number at Ohio State is approximately 40,000. We conclude that

a the sample from Johns Hopkins has much less variability than that from Ohio State.
b the sample from Johns Hopkins has much more variability than that from Ohio State.
c the sample from Johns Hopkins has almost the same variability as that from Ohio State.
d it is impossible to make any statements about the variability of the two samples since the students surveyed were different.

5. The number of undergraduates at Johns Hopkins University is approximately 2000, while the number at Ohio State University is approximately 40,000. At both schools a simple random sample of about 3% of the undergraduates is taken. We conclude that

a the sample from Johns Hopkins has less variability than that from Ohio State.
b the sample from Johns Hopkins has more variability than that from Ohio State.
c the sample from Johns Hopkins has almost the same variability as that from Ohio State.
d it is impossible to make any statements about the variability of the two samples since the students surveyed were different.

A survey asks a random sample of 1500 adults in Ohio if they support an increase in the state sales tax from 5% to 6%, with the additional revenue going to education. Let p denote the proportion in the sample that say they support the increase. Suppose that 40% of *all* adults in Ohio support the increase.

6. The mean μ_p of p is

a 5%.
b 40% ± 5%.
c) 600.
d) 0.40.

7. The standard deviation σ_p of p is

a 0.40.
b 0.24.
c) 0.00016.
d) 0.0126.

8. The probability that p is more than 0.50 is

a less than 0.0001.
b about 0.1.
c 0.4602.
d 0.50.

9. Suppose we select an SRS of size $n = 100$ from a large population having proportion p of successes. Let X be the number of successes in the sample. For which value of p would it be safe to assume the sampling distribution of X is approximately normal?

a 0.01.
b 1/9.
c 0.975.
d 0.9999.

10. A multiple-choice exam has 100 questions, each with five possible answers. If a student is just guessing at all the answers, the probability that he or she will get more than 30 correct is

a 0.2500.
b 0.1230.
c 0.1056.
d 0.0400.

11. An automobile insurer has found that repair claims have a mean of $920 and a standard deviation of $870. Suppose that the next 100 claims can be regarded as a random sample from the long-run claims process. The mean and standard deviation of the average J of the next 100 claims is

a mean = $920 and standard deviation = $87.
b mean = $920 and standard deviation = $8.70.
c mean = $92 and standard deviation = $87.
d mean = $92 and standard deviation = $870.

12. A random variable X has mean μ_X and standard deviation σ_X. Suppose n independent observations of X are taken and the average J of these n observations is computed. We can assert that if n is very large, the sampling distribution of J is approximately normal. This assertion follows from

a the law of large numbers.
b the central limit theorem.
c the definition of sampling distribution.
d the bell curve.

13. A researcher initially plans to take a SRS of size n from a population that has mean 80 and standard deviation 20. If he were to double his sample size (to $2n$), the standard deviation of the sampling distribution of J would change by a factor of

a $\sqrt{2}$.
b $1/\sqrt{2}$.
c 2.
d 1/2.

The distribution of actual weights of 8-ounce chocolate bars produced by a certain machine is normal with mean 8.1 ounces and standard deviation 0.1 ounces.

14. If a sample of five of these chocolate bars is selected, the probability that their average weight is less than 8 ounces is

a 0.0125.
b 0.1853.
c 0.4871.
d 0.9873.

15. If a sample of five of these chocolate bars is selected, there is only a 5% chance that the average weight of the sample of five of the chocolate bars will be below

a 7.94 ounces.
b 8.03 ounces.
c 8.08 ounces.
d 8.20 ounces.

Part II – Free Response: Show all work on the answer sheet. Write clearly and completely.

1. Consider the following set of numbers as a population: {2, 4, 6, 8, 10}

   a) Show all possible samples of size 2 from this population (there should be 10).

   b) Construct a histogram of the means of the samples found in part **a**.

   c) What is the mean of the histogram in part **b**?

   d) Explain why the result in part **c** should not be a surprise.

2. A study of college freshmen's study habits found that the time (in hours) that they use to study each week varies with a mean of 7.2 hours and a standard deviation of 5.3 hours. Additionally, this distribution displays a skew to the right. The student newspaper at a large university will survey a random sample of 50 freshmen at their school for the purpose of comparing to this published data. Consider these 50 an SRS of all college freshmen.

   a) What is the mean and standard deviation for the sampling distribution for this sample?

   b) Is it safe to assume that the sampling distribution in part **a** will be approximately normal? Explain.

   c) Find the probability that the newspaper study will result in a mean number of hours used to study that is more than 8.5.

3. Thirty-five percent of American adult males suffer from Male Pattern Baldness (MPb. An SRS of 400 American males is chosen for a survey on the psychological effects of baldness.

   a) Justify the use of a normal approximation for the sampling distribution of the proportion of males in the sample that suffer from MPB.

   b) Find the mean and standard deviation of the sampling distribution described in part **a**.

   c) What is the probability that fewer than 30% of the sample suffers from MPB?

Answer Key Form A

1. a
2. c
3. b
4. c
5. b
6. d
7. d
8. a
9. b
10. c
11. a
12. b
13. b
14. a
15. b

Free Response (Show all necessary work. Be sure to communicate clearly and completely)

1. (a)

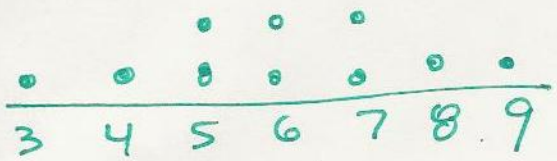
	$\bar{x}$
2, 4	3
2, 6	4
2, 8	5
2, 10	6

	$\bar{x}$
4, 6	5
4, 8	6
4, 10	7

	$\bar{x}$
6, 8	7
6, 10	8

	$\bar{x}$
8, 10	9

(b)



(c) $\bar{x} = 6$

2d) Mean of all samples will equal the mean of the population (6)

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2. $\mu = 7.2$, $\sigma = 5.3$, $n = 50$

2a) $\mu = 7.2$, $\sigma = 5.3/\sqrt{50} = .7495$

1b) Yes, because $n = 50 \geq 30$ (large sample size) (Central Limit Theorem)

2c) MEANS

$z = \frac{8.5 - 7.2}{.7495} = 1.73$

So $\boxed{p = .0418}$

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3. $n = 400$, $p = .35$

2a) ROT1: Pop of Am. adult males $> 10 \cdot 400$ ✓ (4000)

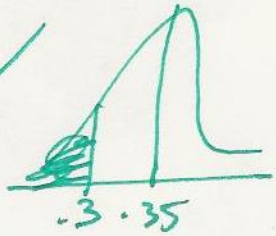
ROT2: $np = 400(.35) = 140 \geq 10$ ✓

$n(1-p) = 400(.65) = 260 \geq 10$ ✓

1b) $\mu = p = .35$

$\sigma = \sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{(.35)(.65)}{400}} = .024$

2c)



$z = \frac{.3 - .35}{.024} = -2.08$

So $\boxed{p = .0188}$

PROPS