Test 9B A P Statistics Name:

Directions: *Work on these sheets. Answer completely, but be concise.*

Part 1: Multiple Choice. *Circle the letter corresponding to the best answer.*

1. A phone-in poll conducted by a newspaper reported that 73% of those who called in liked business tycoon Donald Trump. The unknown true percentage of American citizens who like Donald Trump is a
   (a) Statistic
   (b) Sample
   (c) Parameter
   (d) Population
   (e) None of the above. The answer is _____.

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 sample size from the same population
   (d) The extent to which the sample results differ systematically from the truth
   (e) None of the above. The answer is _____.

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 honest purposes only
   (e) None of the above. The answer is _____.

4. 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. Which of the following is the best conclusion?
   (a) The sample from Johns Hopkins has less sampling variability than that from Ohio State.
   (b) The sample from Johns Hopkins has more sampling variability than that from Ohio State.
   (c) The sample from Johns Hopkins has almost the same sampling variability as that from Ohio State.
   (d) It is impossible to make any statement about the sampling variability of the two samples since the students surveyed were different.
   (e) None of the above. The answer is _____.

5. In a large population, 46% of the households own VCRs. A simple random sample of 100 households is to be contacted and the sample proportion computed. What is the standard deviation of the sampling distribution of the sample proportion?
   (a) 46
   (b) 0.46
   (c) 0.00248
   (d) 0.005
   (e) None of the above. The answer is $\sqrt{\frac{.46(1-.46)}{100}} = .05$.

6. In a large population of adults, the mean IQ is 112 with a standard deviation of 20. Suppose 200 adults are randomly selected for a market research campaign. The distribution of the sample mean IQ is
   (a) Exactly normal, mean 112, standard deviation 20.
   (b) Approximately normal, mean 112, standard deviation 0.1.
   (c) Approximately normal, mean 112, standard deviation 1.414.
   (d) Approximately normal, mean 112, standard deviation 20.
   (e) Exactly normal, mean 112, standard deviation 1.414.

7. The law of large numbers states that, as the number of observations drawn at random from a population with finite mean μ increases, the mean $\bar{x}$ of the observed values
   (a) Gets larger and larger.
   (b) Gets smaller and smaller.
   (c) Gets closer and closer to the population mean μ.
   (d) Fluctuates steadily between one standard deviation above and one standard deviation below the mean.
   (e) Varies randomly about μ.

Part 2: Free Response *Communicate your thinking clearly and completely.*

A population with mean μ and standard deviation σ is randomly sampled with sample size n.

8. What is the *mean* of the sample means? $\mu_{\bar{x}} = \mu$

9. What is the *standard deviation* of the sample means? $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

10. What is the *shape* of the sampling distribution of $\bar{x}$? Justify your answer.

If n is large, then the sampling distribution will be approximately normal. (by the C.L.T.)
If n is small, then the sampling distribution will look similar to the population distribution.