

AP Statistics | Unit 05 – Distributions ReviewMultiple-Choice

1. A factory produces plate glass with a mean thickness of 4 mm and a standard deviation of 1.1 mm. A simple random sample of 100 sheets of glass is to be measured, and the sample mean thickness of the 100 sheets \bar{x} is to be computed. We know the random variable \bar{x} has an approximately Normal distribution because of...
 - a. The law of large numbers.
 - b. The central limit theorem.
 - c. The law of proportions.
 - d. The law of means.
 - e. The fact that probability is the long-run proportion of times an event occurs.
2. Using the information in the previous problem, the probability that the average thickness \bar{x} of the 100 sheets of glass is less than 4.1 mm is approximately...
 - a. 0.8186
 - b. 0.3183
 - c. 0.1814
 - d. 0.6817
 - e. 0.50
3. 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 probability that the sample mean IQ is greater than 110 is approximately...
 - a. 0.079
 - b. 0.421
 - c. 0.921
 - d. 0.579
 - e. 0.000
4. 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. 0.0061
 - d. 0.0400
 - e. 0.1604

5. Supposed you are going to roll a die 60 times and record p , the proportion of times that an even number is showing. The sampling distribution of \hat{p} should be centered about...
- $1/6$
 - $1/3$
 - $1/2$
 - 30
 - 60
6. The number of undergraduates at Johns Hopkins University is approximately 2000, which 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 can conclude that...
- The sample from Johns Hopkins has less variability than that from Ohio State.
 - The sample from Johns Hopkins has more variability than that from Ohio State.
 - The sample from Johns Hopkins has almost the same variability as that from Ohio State.
 - It is impossible to make any statements about the variability of the two samples since the students surveyed were different.
 - It is impossible to make any statements about the variability of the two samples since the students surveyed were the same.
7. The variability of a statistic is described by...
- The spread of its sampling distribution.
 - The amount of bias present.
 - The vagueness in the wording of the question used to collect the sample data.
 - The stability of the population it describes.
 - None of the above.

Use the following information to answer questions 8-10:

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

8. The mean $\mu_{\hat{p}}$ of \hat{p} is
 - a. 5%
 - b. 40% +/- 5%
 - c. 0.40
 - d. 600
 - e. 6%

9. The standard deviation $\sigma_{\hat{p}}$ of \hat{p} is
 - a. 0.40
 - b. 0.24
 - c. 0.0126
 - d. 0.00016
 - e. none of the above

10. The probability that \hat{p} is more than 0.50 is
 - a. less than 0.0001
 - b. about 0.1
 - c. 0.4602
 - d. 0.50
 - e. none of the above

Free Response

1. It is estimated that 80% of people with high math anxiety experience brain activity similar to that experienced under physical pain when anticipating doing a math problem. In a simple random sample of 110 people with high math anxiety, what is the probability that less than 75% experience physical pain brain activity?

2. Several coffee manufacturers have discontinued the practice of packaging their product in 1-pound containers. The mean weight of a particular container is Normally distributed with a mean of 383 grams and a standard deviation of 5.4 grams. Find the probability that a random sample of 23 containers will have an average weight of at least 382 grams.

3. A fruit-filled cereal is packaged in boxes that contain an average of 450 grams and for which the standard deviation is 12 grams. A sample of 36 boxes is randomly selected. Find the probability that the sample mean will be at least 454 grams.