

STAT303: Sec 508

Fall 2005

Exam #2

Form A

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1. **Don't EVEN open this until you are told to do so.**
2. Be sure to mark your CORRECT section number and your test form on the scantron!
3. Sign your name where indicated on your scantron AND on this exam. You will this exam back.
4. There are 20 multiple-choice questions on this exam, each worth 5 points. There is partial credit. Please mark your answers **clearly** on the scantron. Multiple marks will be counted wrong.
5. You will have **60 minutes** to finish this exam.
6. This exam is worth 100 points, and will constitute 20% of your final grade.
7. If you are caught cheating or helping someone to cheat on this exam, you both will receive a grade of **zero** on the exam. You must work alone AND NOT discuss this exam with anyone until AFTER the grades are posted.
8. Good luck!

1. Which of the following is true?
 - A. Every statistic has a sampling distribution.
 - B. Every statistic's distribution can be approximated by the normal distribution.
 - C. Every statistic is an unbiased estimate of its parameter, *i.e.*, \bar{x} is unbiased for μ .
 - D. All of the above are true.
 - E. Exactly two of the above are true.
2. Let $X \sim N(1, 2^2)$. What is the probability that we get an X that is more than 2 standard deviations above OR (2 standard deviations) below its mean?
 - A. 0.9544
 - B. 0.0228
 - C. 0.0456
 - D. 0.6826
 - E. 0.3174
3. If X is a continuous random variable, then $P(a < X < b) = ?$
 - A. $1 - P(X \leq a) - P(X < b)$
 - B. $1 - P(X \geq a) - P(X > b)$
 - C. $P(X < b) + P(X > a)$
 - D. $P(X > b) - P(X < a)$
 - E. None of the above are correct.

other D. $P(X < b) - P(X < a)$
4. What do we mean by the term *confidence* in reference to confidence intervals?
 - A. We are confident that our interval contains the parameter.
 - B. We are confident that our data is random.
 - C. We are confident that our method produces confidence intervals that contain the parameter of interest α 100% of the time.
 - D. We are confident that our method produces intervals which contain the parameter of interest $(1-\alpha)$ 100% of the time.
 - E. We are confident that our method produces intervals that contain the statistic of interest $(1-\alpha)$ 100% of the time.
5. In reference to the homework problem on authorship of literary works that tested whether a new manuscript had more new words on average than a particular author (called him Dr. No), which of the following would be a Type I error?
 - A. We concluded that the new manuscript was a different author when actually it was written by Dr. No.
 - B. We concluded that the new manuscript was a different author when actually it was NOT written by Dr. No.
 - C. We failed to prove it was Dr. No even though the new manuscript was written by Dr. No.
 - D. We failed to prove it was a different author even though the new manuscript was written by Dr. No.
 - E. We failed to prove it was a different author even though the new manuscript was NOT written by Dr. No.
6. For $Z \sim N(0, 1^2)$ what is $P(Z > 0.06)$?
 - A. 0.5239
 - B. 2.49.
 - C. -1.555
 - D. 1.555
 - E. 0.4761
- or 6. For $Z \sim N(0, 1^2)$ what is $P(Z > 0.66)$?
 - A. 0.41
 - B. 0.7454
 - C. 0.2546
 - D. -0.41
 - E. 0.5239
7. For which value(s) of π will the rule for using the normal approximation hold, if we take a sample of size 25(or 30)? (π is the true population proportion)
 - A. 0.20
 - B. 0.50
 - C. 0.75
 - D. Two of the above
 - E. We must always have a sample size of at least 30, so it will NOT hold for any value of π .

other E. All we need to have is a sample size of at least 30, so it will hold for any value of π .

8. Which of the following statements is/are true?
- A. To increase the power of the test, we must increase our chance of making a Type I error.
 - B. We should always use as large of a sample as we can afford, even 10,000 if possible.
 - C. Confidence intervals and tests of hypotheses give us the same information, so we can use them interchangeably.
 - D. A Type I error is always worse than a Type II which is why we can set α but not β .
 - E. None of the above are true statements.

9. Let $X \sim N(13, 5^2)$. What is $P(7 < X < 20)$?
- A. 0.0343
 - B. 0.2
 - C. 0.8041
 - D. 0.5793
 - E. 0.8413

- or 9. Let $\bar{X}_4 \sim N(13, 5^2)$, sample means based on samples of size 4. What is $P(7 < \bar{X}_4 < 20)$?
- A. 0.0343
 - B. 0.9892
 - C. 0.8041
 - D. 0.5793
 - E. 0.0056

10. What affects the sampling distribution of the sample mean?
- A. whether the sample is random or not
 - B. the size of the sample, n
 - C. the size of parent population, N
 - D. All of the above affect the sampling distribution of the sample mean.
 - E. only A and B

X	0	1	2	3	4	
p(X)	0.25	0.5	0.1	0.1	0.05	

11. What is the mean of X in the distribution above?
- A. $\mu = 2$
 - B. $\mu = 1.5$
 - C. $\mu = 1.2$
 - D. $\mu = 1$
 - E. none of the above

12. What is $P(1.5 \leq X < 4)$ for the same distribution?
- A. 0.4
 - B. 0.7
 - C. 0.35
 - D. 0.2
 - E. 0.25

13. How likely are we to get three 3's from the distribution above?
- A. 0, the probability that X exactly equals any number is always 0.
 - B. $0.1 + 0.1 + 0.1$
 - C. 0.1
 - D. 0.1^3
 - E. 0.03

14. What are the $\pm z_{\alpha/2}$'s for a 75% confidence interval, i.e., $P(-z^* < Z < z^*) = 0.75$ where $Z \sim N(0, 1^2)$?
- A. ± 0.675
 - B. ± 1.15
 - C. ± 1.44
 - D. ± 0.7743
 - E. ± 1.23

15. A 98% confidence interval for the true mean scale reading when weighing a 10 gram weight is (10.00427, 10.00573). Which of the following is the correct conclusion?
- A. The scale is very precise since this interval is so narrow.
 - B. The scale is biased since the sample mean is not 10.
 - C. The scale is biased since 10 is not in the interval.
 - D. The true mean of the 10 gram weight is not 10 since 10 is not in the interval.
 - E. None of the above are the correct conclusion.

16. Suppose the sampling distribution of the sample mean for a simple random sample of size 50, \bar{X}_{50} , from some population is approximately normally distributed. The distribution of the original population (the one we from which we sampled) must have been
- A. normal.
 - B. uniform.
 - C. skewed.
 - D. continuous.
 - E. We could have had any of the above.

17. The mean area of several thousand apartments in a new development is advertised to be 1250 square feet. A tenant group thinks that the apartments are smaller than advertised. They hire an engineer to measure a sample of apartments. What should H_A be to test their suspicion?
- $H_A : \bar{X} \neq 1250$ where \bar{X} is the mean area of apartments in the engineer's sample.
 - $H_A : \pi < 0.5$ where π is the proportion of apartments with area smaller than 1250 square feet.
 - $H_A : \mu = 1250$ where μ is the mean area of apartments.
 - $H_A : \mu > 1250$ where μ is the mean area of apartments.
 - $H_A : \mu < 1250$ where μ is the mean area of apartments.
18. The Central Limit Theorem states that
- The sampling distribution of any statistic will be approximately normally distributed as long as you take a large enough sample.
 - The sampling distribution of the sample proportion will be approximately normally distributed as long as you take a sample larger than 30.
 - The distribution of the sample will be approximately normally distributed as long as the sample size is large enough.
 - The sampling distribution of any statistic will be approximately normally distributed as long as the original population is normal.
 - None of the above are correct statements of the Central Limit Theorem.
- 90%: (0.477, 0.535)
 95%: (0.471, 0.541)
 99%: (0.460, 0.552)
19. What is the correct range of the p - value for testing $H_0 : \mu = 0.545$ (or 0.45) vs. $H_A : \mu \neq 0.545$ (or 0.45) given the three confidence intervals for μ above?
- p -value > 0.10
 - $0.10 > p$ -value > 0.05
 - $0.05 > p$ -value > 0.01
 - p -value < 0.01
 - You need a test statistic value to determine the p -value
20. Suppose the diastolic blood pressure of a sample of 25 Aggies is $N(65, 5^2)$. What is the probability that any simple random sample of 25 Aggies has an average diastolic blood pressure within 2.5 of the true mean, *i.e.*, $P(62.5 < \bar{X}_{25} < 67.5)$?
- 0.617
 - 0.9544
 - 0.383
 - 0.9876
 - 1
- 1A,2C,3E(orD),4D,5A,6E(orC),7B,8E,9C,10E,11C
 12D,13D,14B,15C,16E,17E,18E,19C(orD),20D