

American University of Beirut

STAT 210

Introductory Statistics

Spring 2004



Final Exam

Date: Wednesday, June 2, 2004 - 11:30 am - 1:00 pm

Instructors: Ms Mona Jurdak, Ms Sylvana Jaber and Dr. Mohamed Kobeissi

Name:

ID #:

Section: Encircle your section please.

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|---------------|--------------|--------------|---------------|
| 1 (Ms Jaber) | 2 (Ms Jaber) | 3 (Ms Jaber) | 4 (Ms Jurdak) |
| F 12-12:50 pm | F 9-9:50 am | T 2-2:50 pm | R 2-2:50 pm |

This is **NOT** an open-book exam. You are allowed to have a formula sheet and a calculator. Your exam should have 5 pages including this one, and there are 30 questions totaling 150 points. A question with more than one answer will be counted as wrong. A correct answer is 5 points, a wrong answer is -1, and an unanswered question is 0 points. Mark your answer on the answer sheet provided at the end of this exam please.

Good Luck

1. Suppose that $[32.2; 36.4]$ is a 98% z-distribution confidence interval for a population mean based on sample of size 64. What is the margin of error?
A. 4.2 B. 36.3 C. 2.1 D. 34.2 E. none of the above
2. Refer to previous question, what is the population standard deviation?
A. 7.22 B. 6.52 C. 14.44 D. 5.76 E. none of the above
3. A variable of two populations has mean 34 and standard deviation 7 for the first population and a mean of 27 and standard deviation of 13 for the second population. For independent samples of size 6 from population one and 4 from population two
 - i) $\bar{x}_1 - \bar{x}_2$ is normally distributed
 - ii) $\bar{x}_1 - \bar{x}_2$ has mean 7
 - iii) $\bar{x}_1 - \bar{x}_2$ has st. dev. -1
 - iv) $\bar{x}_1 - \bar{x}_2$ has a standard normal distributionA. (i) B. (ii) C. (iii) D. (iv) E. none of the above

- I. Use the following information to answer questions 4 to 9. A survey claims that the average cost of a hotel room in Beirut is \$69.21. To test the claim, a researcher selects a sample of 30 hotel rooms and finds that the average cost is \$68.43, with a sample standard deviation \$3.56. The researcher believes that the sample data will show that the average cost of a hotel room is not \$69.21.
4. What are the null and the alternative hypothesis to test researcher's claim versus the hotel claim?
- i) $H_0 : \mu = \$69.21$ vs. $H_a : \mu < \$69.21$
 ii) $H_0 : \mu = \$69.21$ vs. $H_a : \mu \neq \$69.21$
 iii) $H_0 : \mu = \$69.21$ vs. $H_a : \mu > \$69.21$
 iv) $H_0 : \mu = \$68.43$ vs. $H_a : \mu < \$68.43$
- A. (i) B. (ii) C. (iii) D. (iv) E. none of the above
5. For $\alpha = 0.1$, what is(are) the critical value(s) of the test?
- A. ± 1.311 B. ± 1.697 C. ± 1.310 D. ± 1.699 E. none of the above
6. What is the value of the test statistic?
- A. 2.43 B. -1.2 C. 6.57 D. -3.58 E. none of the above
7. What is the P-value, P , of test?
- A. $P < 0.01$ B. $0.01 < P < 0.025$ C. $P = 0.05$ D. $P > 0.1$ E. none of the above
8. Construct a 90% confidence interval for μ .
- A. [67.32; 69.53] B. [67.36; 69.49] C. [67.36; 69.53] D. [67.32; 69.49] E. none of the above
9. If in fact the average cost of a hotel room in Beirut is not \$69.21, then accepting H_0 is:
- i) type I error
 ii) correct decision
 iii) type II error
 iv) no decision can be made
- A. (i) B. (ii) C. (iii) D. (iv) E. none of the above
10. 70.3% of females ages 20 to 24 have never been married. Five women in this age category are randomly selected. What is the probability that none of them have never been married?
- A. 0.06 B. 0.17 C. 0.002 D. 0.24 E. none of the above
11. Each of three persons fire one shot on a target. Let A_i denote the event that the target is hit by person i , $i = 1, 2, 3$. If we assume that A_1 , A_2 and A_3 are mutually independent and if $P(A_1) = 0.7$, $P(A_2) = 0.8$ and $P(A_3) = 0.9$, what is the probability that exactly one person misses the target?
- A. 0.398 B. 0.216 C. 0.056 D. 0.126 E. none of the above

12. The significance level of a hypothesis test is best defined as:

- i) the probability of retaining H_0 when H_0 is true.
- ii) the probability of rejecting H_0 when H_0 is true.
- iii) the probability of retaining H_0 when H_0 is false.
- iv) the probability of rejecting H_0 when H_0 is false.

A. i) B. ii) C. iii) D. vi) E. none of the above

II. Use the following information to answer questions 13 to 20. A researcher was interested in comparing the amount of time spent watching television by women and by men. Independent random samples of 14 women and 17 men were selected and each person was asked how many hours he or she had watched television during the previous week. The summary statistics are as follows.

sample 1 (women)	sample 2 (men)
$\bar{x}_1 = 11.3$	$\bar{x}_2 = 17.0$
$s_1 = 4.3$	$s_2 = 4.8$
$n_1 = 14$	$n_2 = 17$

13. What are the null and alternative hypotheses to test that women spend less time than men watching television?

- i) $H_0 : \mu_1 - \mu_2 = 5.7$ vs. $H_a : \mu_1 - \mu_2 \neq 5.7$
- ii) $H_0 : \mu_1 = \mu_2$ vs. $H_a : \mu_1 < \mu_2$
- iii) $H_0 : \mu_1 = \mu_2$ vs. $H_a : \mu_1 > \mu_2$
- iv) $H_0 : \mu_1 = \mu_2$ vs. $H_a : \mu_1 \neq \mu_2$

A. (i) B. (ii) C. (iii) D. (iv) E. none of the above

14. Assuming equal population standard deviation, what is the pooled standard deviation?

A. 5.12 B. 3.45 C. 4.58 D. 2.90 E. none of the above

15. Assuming equal population standard deviation, what is the value of the test statistic for $H_0 : \mu_1 = \mu_2$?

A. -3.45 B. -3.56 C. -2.97 D. -3.48 E. none of the above

16. Assuming equal population standard deviation, what is the P-value, P , of the test?

A. $P > 0.2$ B. $0.01 < P < 0.05$ C. $P = 0.01$ D. $P < 0.005$ E. none of the above

17. Assuming equal population standard deviation, find a 95% confidence interval for the difference between the two means $\mu_1 - \mu_2$.

A. [-9.05;-2.34] B. [-9.08;-2.34] C. [-9.05;-2.31] D. [-9.08;-2.31] E. none of the above

18. At 5% significance level,
- H_0 is accepted
 - we don't have enough evidence against H_0
 - we are undecided
 - there is enough evidence to support the claim that women spend less time than men watching television
- A. (i) B. (ii) C. (iii) D. (iv) E. none of the above
19. Assuming unequal population variances, what is the degree of freedom for $H_0 : \mu_1 = \mu_2$?
- A. 30 B. 29 C. 27 D. 28 E. none of the above
20. Assuming unequal population variances, what is(are) the critical value(s) for testing $H_0 : \mu_1 = \mu_2$ vs $H_a : \mu_1 < \mu_2$, with $\alpha = 0.01$?
- A. -2.763 B. 2.763 C. -2.467 D. 2.467 E. none of the above
21. In how many ways can the letters a, b, c, d, e, f , be arranged so that the letters a and b are adjacent?
- A. 480 B. 360 C. 720 D. 240 E. none of the above
22. In how many ways can the letters a, b, c, d, e, f , be arranged so that the letters a and b are not adjacent?
- A. 360 B. 240 C. 480 D. 720 E. none of the above
23. The grades of a statistic class is normally distributed with mean 83 and standard deviation 15. What is the probability that the sum of the grades of 30 students of the class will exceed 2550?
- A. 0.47 B. 0.53 C. 0.77 D. 0.23 E. none of the above
24. One card is randomly selected form a deck of 52 playing cards. Let
- A = event a queen is selected
- B = event a diamond is selected
- Find $P(B|A)$.
- A. 0.25 B. 0.077 C. 0.308 D. 0.019 E. none of the above
25. Find the probability of answering the first 3 questions on a multiple choice test correctly if random guesses are made and each questions has 6 possible answers.
- A. $1/729$ B. $3!/6!$ C. $1/6!$ D. $1/216$ E. none of the above
26. Machine A produces 2% defective items and machine B produces 5% defective items. A machine is randomly selected then an item produced by this machine is selected, it's found to be defective. What is the probability that it came from machine B?
- A. 0.333 B. 0.714 C. 0.5 D. 0.62 E. none of the above

27. For a two-tailed one-sample z-test, the value obtained for the test statistic was -0.67. Determine the P -value, P .

- A. 0.25 B. 0.50 C. 0.37 D. 0.74 E. none of the above

28. A restaurant owner wishes to find the 99% confidence interval for the true mean cost of a dry martini. How large should the sample be if she wishes to be accurate within \$0.10? A previous study showed that the standard deviation of the price was \$0.12.

- A. 9 B. 10 C. 11 D. 8 E. none of the above

III. Use the following information to answer questions 29 to 30. The average price of a personnel computer (PC) is \$949. The computer prices are normally distributed with standard deviation \$100.

29. What is the probability that a randomly selected PC costs more than \$1200?

- A. 0.002 B. 0.994 C. 0.006 D. 0.047 E. none of the above

30. The cheapest 10% of PC cost less than what amount?

- A. 870.5 B. 820.8 C. 910.3 D. 889.6 E. none of the above