

Mark your answer on the answer sheet provided. A question with more than one answer will be counted as wrong. A correct answer is 5 points, a wrong answer is -1 point and an unanswered question is 0 points. The entire quiz must be turned-in.

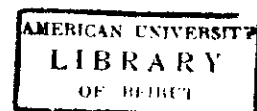
I. Use the following information to answer Questions 1 to 16. Two samples of the price of oranges per kilogram have been obtained from stores in Lebanon. Sample 1 has sample mean 1200 LL, sample standard deviation 450 and sample size 31. Sample 2 has sample mean 1500 LL, sample standard deviation 400 and sample size 31. Normal distributions may be assumed.

- The accepted population mean,  $\mu$ , is 1400 LL per kilogram. Using sample 1, what is the null and alternative hypothesis that the mean is smaller.
  - $H_0: \mu = 1200$  vs.  $H_A: \mu < 1200$
  - $H_0: \mu = 1400$  vs.  $H_A: \mu > 1400$
  - $H_0: \mu = 1300$  vs.  $H_A: \mu \neq 1300$
  - $H_0: \mu = 1400$  vs.  $H_A: \mu \neq 1400$
  - None of the above.
- What is the value of the test statistic for testing that  $\mu$  is smaller than 1400 LL per kilogram using sample 1?
  - 2.47
  - 1.24
  - 1.24
  - 3.71
  - None of the above.
- What is the P-value, P, for testing that  $\mu$  is smaller than 1400 LL per kilogram using sample 1?
  - $P < 0.005$
  - $0.005 < P < 0.01$
  - $0.025 < P < 0.01$
  - $P > 0.1$
  - None of the above.
- For a left tailed test, using sample 1, at what significance level would the null hypothesis be rejected?
  - At the 0.5% significance level.
  - At the 1% significance level.
  - At all significance levels.
  - At no significance level.
  - None of the above.
- Using sample 1 what is a 95% confidence interval for  $\mu$ .
  - (1041.59, 1358.41)
  - (1250, 1550)
  - (1034.96, 1365.04)
  - (1234.96, 1565.04)
  - None of the above.



To answer questions 6 to 11 consider the two samples of the price of oranges as independent samples from two different normal populations.

- Assuming equal population variances, what is the pooled sample standard deviation?
  - 425.73
  - 602.08
  - 0.425
  - 20.62
  - None of the above.
- Assuming equal population variances, what is the value of the test statistic for  $H_0: \mu_1 = \mu_2$ ?
  - 1.85
  - 2.77
  - 3.92
  - 2.77
  - None of the above.
- Assuming equal population variances, what is the P-value, P, for testing  $H_0: \mu_1 = \mu_2$  vs.  $H_A: \mu_1 \neq \mu_2$ ?
  - $P > 0.2$
  - $0.05 < P < 0.1$
  - $0.01 < P < 0.02$
  - $P < 0.01$
  - None of the above.
- Assuming unequal population variances, what is the degrees of freedom for  $H_0: \mu_1 = \mu_2$ ?
  - 61
  - 60
  - 59
  - 30
  - None of the above.
- Assuming unequal population variances, what is the value of the test statistic for  $H_0: \mu_1 = \mu_2$ ?
  - 1.85
  - 2.77
  - 3.92
  - 2.77
  - None of the above.
- Assuming unequal population variances, what are the critical values for testing  $H_0: \mu_1 = \mu_2$  vs.  $H_A: \mu_1 \neq \mu_2$  with  $\alpha = 0.05$ ?
  - $\pm 2.042$
  - $\pm 2.009$
  - $\pm 2.000$
  - $\pm 1.994$
  - None of the above.



To answer questions 12 to 16 consider the two samples of the price of oranges as a paired sample for which the mean of the differences, sample 1 - sample 2, is -300 and the standard deviation of the differences is 602.

- What are the null and alternative hypotheses to test that the difference in prices is not zero?
  - $H_0: \mu_1 = \mu_2$  vs.  $H_A: \mu_1 < \mu_2$
  - $H_0: \mu_1 - \mu_2 = -300$  vs.  $H_A: \mu_1 - \mu_2 \neq -300$
  - $H_0: \mu_1 = \mu_2$  vs.  $H_A: \mu_1 \neq \mu_2$
  - $H_0: \mu_1 = \mu_2$  vs.  $H_A: \mu_1 > \mu_2$
  - None of the above.

13. What is the value of the test statistic for testing that the difference in prices is not zero?  
 A. -1.85    B. -2.77    C. -3.93    D. -0.5    E. None of the above.
14. What is the P-value, P, for testing that the difference in prices is not zero?  
 A.  $P < 0.01$     B.  $0.01 < P < 0.02$     C.  $0.05 < P < 0.02$     D.  $P > 0.2$     E. None of the above.
15. What is the 95% confidence interval for  $\mu_1 - \mu_2$  ?  
 A. (-520.79, -79.21)    B. (79.21, 520.79)    C. (-516.24, -83.76)  
 D. (-483.48, -116.52)    E. None of the above.
16. At the 5% significance level what would be the results of testing that the difference in prices is not zero?  
 A. Accept  $H_0$ .    B. Do not reject  $H_0$ .    C. Reject  $H_0$ .    D. Inconclusive.    E. None of the above.

**II. Use the following information to answer questions 17 and 18. Consider the following paired sample data.**

sample 1		21	56	34	30	41	28	26	38	27	30
sample 2		24	55	44	34	32	38	38	45	33	41

17. What is the sample mean of the differences, d, (sample 1 - sample 2) ?  
 A. -53    B. -5.3    C. 5.3    D. -5.1    E. None of the above.
18. What is the sample variance of the differences,  $S_d^2$  ?  
 A. 52.12    B. 46.91    C. 43.79    D. 41.79    E. None of the above.
19. What is the standard error of the sample mean for  $n = 25$  from a population with  $\mu = 10$  and  $\sigma^2 = 36$ ?  
 A. 1.44    B. 0.69    C. 0.83    D. 1.2    E. None of the above.
20. Which of the following is(are) **false**?  
 i) The mean of the sample mean is always equal to the mean of the population.  
 ii) The distribution of the sample mean is always normal when the population is normal.  
 iii) The distribution of the sample mean is always normal when  $n$  is large enough.  
 iv) For large  $n$  the standard deviation of the sample mean is never equal to the standard deviation of the population.  
 A. i)    B. ii) and iii)    C. ii), iii) and iv)    D. iv)    E. None of the above.
21. Which of the following is(are) **true**? (Z-distribution  $\equiv$  standard normal distribution)  
 i). The t-distribution critical values have smaller magnitude than the corresponding Z-distribution critical values.  
 ii). The height of the peak for the t-distribution approaches zero as the degrees of freedom becomes large.  
 iii). The length of a confidence interval decreases as the confidence level increases.  
 iv). The significance level of a hypothesis test is equal to the probability of a Type II error.  
 A. i)    B. i) and ii)    C. i), ii) and iii)    D. i), ii), iii) and iv)    E. None of the above.
22. If it is required to estimate the mean price of oranges in Lebanon to within 100 LL, what sample size is required to be 99% confident? Assume that the population is normal and the population standard deviation is 350 LL.  
 A. 47    B. 48    C. 81    D. 82    E. None of the above.

**III. Use the following information to answer Questions 23 to 27.**

**Let (33.11, 39.69) be a 90% standard normal distribution confidence interval from a sample of size 25.**

23. What is the margin of error?  
 A. 6.6    B. 6.58    C. 3.35    D. 3.29    E. None of the above.
24. What is the sample mean?  
 A. 36.69    B. 36.4    C. 35.4    D. 6.58    E. None of the above.
25. What is  $z_{\alpha/2}$  ?  
 A. 1.96    B. 1.645    C. 2.575    D. 2.33    E. None of the above.

26. What is the standard error?  
 A. .10    B. 1.00    C. 2    D. 12.85    E. None of the above.

27. Which of the following tests of hypotheses would **reject**  $H_0$  with  $\alpha = 0.1$  ?  
 A.  $H_0: \mu = 33$  vs.  $H_A: \mu < 33$     B.  $H_0: \mu = 40$  vs.  $H_A: \mu > 40$   
 C.  $H_0: \mu = 36$  vs.  $H_A: \mu \neq 36$     D.  $H_0: \mu = 33$  vs.  $H_A: \mu \neq 33$     E. None of the above.

IV. Use the following contingency table to answer Questions 28 to 32.

	B	C	D
X	3	7	10
Y	9	6	5

28. What is the sample size?  
 A. 15    B. 20    C. 40    D. 80    E. None of the above.
29.  $P(X \& B) =$   
 A. 3/40    B. 12/40    C. 8/20    D. 3/20    E. None of the above.
30.  $P(X | \text{not } C) =$   
 A. 13/40    B. 13/27    C. 0    D. 27/40    E. None of the above.
31.  $P(X \text{ or not } D) =$   
 A. 35/40    B. 5/40    C. 15/20    D. 20/40    E. None of the above.
32. Of the following statements, which are(is) correct?  
 i). C and D are disjoint events.    ii). X and Y are complementary events.    iii). C and Y are independent events.  
 A. i)    B. ii)    C. i) and ii)    D. i), ii) and iii)    E. None of the above.

V. Use the following set of nine digits, D, to answer Questions 33 to 35.  $D = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$

33. How many three digit numbers, with repetition allowed, can be made using digits from D?  
 A. 81    B. 729    C. 648    D. 504    E. None of the above.
34. How many three digit numbers, with repetition **not** allowed, can be made using digits from D?  
 A. 504    B. 84    C. 648    D. 27    E. None of the above.
35. How many three digit numbers, such that the three digits are **strictly** increasing from left to right, can be made using digits from D?  
 A. 504    B. 729    C. 84    D. 27    E. None of the above.

VI. Use the following information to answer questions 36 to 38. Let X be a binomial random variable with  $p = 0.40$ , the probability of success.

36. For  $n = 3$ , what is  $P(X \leq 1)$ ?  
 A. 0.352    B. 0.648    C. 0.216    D. 0.432    E. None of the above.
37. For  $n = 150$ , what is the approximate value of  $P(X < 59)$ ?  
 A. 0.4325    B. 0.4681    C. 0.4013    D. 0.5987    E. None of the above.
38. For  $n = 12$ , what is the expected value of X?  
 A. 4.8    B. 5.0    C. 7.2    D. 2.88    E. None of the above.
39. For a one sample Z procedure, what is the P-value for a left tailed test? Z = standard normal distribution.  
 A.  $P(Z \leq -z_0)$     B.  $P(Z \leq z_0)$     C.  $P(Z \geq z_0)$     D.  $2P(Z \leq -z_0)$     E. None of the above.
40. Complete the statement. For a test of hypothesis, if the P-value is smaller than the significance level then  
 A. the magnitude of the observed value of the test statistic is larger than the magnitude of the critical value.  
 B. the magnitude of the critical value is larger than the magnitude of the observed value of the test statistic.  
 C. a Type I error has occurred.    D. a Type II error has occurred.    E. None of the above.

ANSWER SHEET Math 208 Final Exam

NAME \_\_\_\_\_

Section # \_\_\_\_\_

SCORE

# correct	x (5) =
# wrong	x (-1) =
total	

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_

9. \_\_\_\_\_

10. \_\_\_\_\_

11. \_\_\_\_\_

12. \_\_\_\_\_

13. \_\_\_\_\_

14. \_\_\_\_\_

15. \_\_\_\_\_

16. \_\_\_\_\_

17. \_\_\_\_\_

18. \_\_\_\_\_

19. \_\_\_\_\_

20. \_\_\_\_\_

21. \_\_\_\_\_

22. \_\_\_\_\_

23. \_\_\_\_\_

24. \_\_\_\_\_

25. \_\_\_\_\_

26. \_\_\_\_\_

27. \_\_\_\_\_

28. \_\_\_\_\_

29. \_\_\_\_\_

30. \_\_\_\_\_

31. \_\_\_\_\_

32. \_\_\_\_\_

33. \_\_\_\_\_

34. \_\_\_\_\_

35. \_\_\_\_\_

36. \_\_\_\_\_

37. \_\_\_\_\_

38. \_\_\_\_\_

39. \_\_\_\_\_

40. \_\_\_\_\_