

MATH 1342

Homework 12 (Sections 8.3 – 8.6)

Instructions: Answer all questions through the EMCF tab of casa under the assignment named “Homework 12” before the deadline.

There is no “Submit” button. Your answers will be automatically submitted once the deadline arrives.

Assignments will be graded out of 20 points.

1. Section 8.3; Problem 2 (Null and Alternate Hypothesis and Rejection Region)

[Group 1: Nitrite; Group 2: Control]

A. $H_0: \mu_1 = \mu_2$; $H_a: \mu_1 < \mu_2$; Rejection Region: $z < -2.05$

B. $H_0: \mu_1 = \mu_2$; $H_a: \mu_1 < \mu_2$; Rejection Region: $t < -2.15$

C. $H_0: \mu_1 = \mu_2$; $H_a: \mu_1 > \mu_2$; Rejection Region: $t > 2.15$

D. $H_0: \mu_1 = \mu_2$; $H_a: \mu_1 \neq \mu_2$; Rejection Region: $z < -2.33$ or $z > 2.33$

E. $H_0: \mu_1 = \mu_2$; $H_a: \mu_1 \neq \mu_2$; Rejection Region: $t < -2.46$ or $t > 2.46$

2. Section 8.3; Problem 2 (Test Statistic)

A. $t = -26.130$ B. $z = -0.759$ C. $t = -0.746$

D. $z = -26.130$ E. $t = -0.759$

3. Section 8.3; Problem 2 (p-value and conclusion)

A. $p = 0.454$; FRH_0 (No sufficient evidence to reject the claim)

B. $p = 0.227$; RH_0 (Sufficient evidence exists to reject the claim)

C. $p = 0.227$; FRH_0 (No sufficient evidence to reject the claim)

D. $p = 0.454$; RH_0 (Sufficient evidence exists to reject the claim)

E. $p = 0.448$; FRH_0 (No sufficient evidence to reject the claim)

4. Section 8.3; Problem 4 (Null and Alternate Hypothesis and Rejection Region)

[Group 1: Method 1; Group 2: Method 2]

- A. $H_0: \mu_1 = \mu_2$; $H_a: \mu_1 < \mu_2$; Rejection Region: $z < -2.33$
- B. $H_0: \mu_1 = \mu_2$; $H_a: \mu_1 < \mu_2$; Rejection Region: $t < -2.39$
- C. $H_0: \mu_1 = \mu_2$; $H_a: \mu_1 > \mu_2$; Rejection Region: $t > 2.39$
- D. $H_0: \mu_1 = \mu_2$; $H_a: \mu_1 > \mu_2$; Rejection Region: $z < -2.33$
- E. $H_0: \mu_1 = \mu_2$; $H_a: \mu_1 \neq \mu_2$; Rejection Region: $t < -2.66$ or $t > 2.66$

5. Section 8.3; Problem 4 (Test Statistic)

- A. $t = 7.385$
- B. $z = 4.629$
- C. $t = 4.629$
- D. $z = 7.385$
- E. $t = 4.595$

6. Section 8.3; Problem 4 (p-value and conclusion)

- A. $p = 0.00001$; RH_0 (Sufficient evidence exists to reject the claim)
- B. $p = 0.648$; RH_0 (Sufficient evidence exists to reject the claim)
- C. $p = 0.677$; FRH_0 (No sufficient evidence to reject the claim)
- D. $p = 0.454$; RH_0 (Sufficient evidence exists to reject the claim)
- E. $p = 0.648$; FRH_0 (No sufficient evidence to reject the claim)

7. Section 8.4; Problem 2 (Null and Alternate Hypothesis and Rejection Region)

[Group 1: Private University; Group 2: Public University]

- A. $H_0: p_1 = p_2$; $H_a: p_1 < p_2$; Rejection Region: $z < -2.33$
- B. $H_0: p_1 = p_2$; $H_a: p_1 < p_2$; Rejection Region: $z < -1.64$
- C. $H_0: p_1 = p_2$; $H_a: p_1 > p_2$; Rejection Region: $z > 2.33$
- D. $H_0: p_1 = p_2$; $H_a: p_1 \neq p_2$; Rejection Region: $z < -2.58$ or $z > 2.58$
- E. $H_0: p_1 = p_2$; $H_a: p_1 \neq p_2$; Rejection Region: $t < -3.02$ or $t > 3.02$

8. Section 8.4; Problem 2 (Test Statistic)

- A. $z = 1.372$
- B. $z = 1.398$
- C. $z = 69.517$
- D. $z = 1.400$
- E. $z = 6.508$

9. Section 8.4; Problem 2 (p-value and conclusion)

- A. $p = 0.919$; RH_0 (Sufficient evidence exists to reject the claim)
- B. $p = 0.162$; RH_0 (Sufficient evidence exists to reject the claim)
- C. $p = 0.919$; FRH_0 (No sufficient evidence to reject the claim)
- D. $p = 1.838$; RH_0 (Sufficient evidence exists to reject the claim)
- E. $p = 0.162$; FRH_0 (No sufficient evidence to reject the claim)

10. Section 8.4; Problem 4 (Null and Alternate Hypothesis and Rejection Region)

[Group 1: Urban; Group 2: Suburban]

- A. $H_0: p_1 = p_2$; $H_a: p_1 < p_2$; Rejection Region: $z < -1.96$
- B. $H_0: p_1 = p_2$; $H_a: p_1 < p_2$; Rejection Region: $z < -1.64$
- C. $H_0: p_1 = p_2$; $H_a: p_1 > p_2$; Rejection Region: $z > 1.64$
- D. $H_0: p_1 = p_2$; $H_a: p_1 \neq p_2$; Rejection Region: $z < -1.96$ or $z > 1.96$
- E. $H_0: p_1 = p_2$; $H_a: p_1 \neq p_2$; Rejection Region: $z < -1.64$ or $z > 1.64$

11. Section 8.4; Problem 4 (Test Statistic)

- A. $z = -0.214$
- B. $z = -2.296$
- C. $z = -0.205$
- D. $z = 13.071$
- E. $z = 2.225$

12. Section 8.4; Problem 4 (p-value and conclusion)

- A. $p = 0.415$; RH_0 (Sufficient evidence exists to reject the claim)
- B. $p = 0.831$; FRH_0 (No sufficient evidence to reject the claim)
- C. $p = 0.585$; FRH_0 (No sufficient evidence to reject the claim)
- D. $p = 0.585$; RH_0 (Sufficient evidence exists to reject the claim)
- E. $p = 0.415$; FRH_0 (No sufficient evidence to reject the claim)

13. Section 8.5; Problem 2 (Test Statistic)

- A. $\chi^2 = 0.036$
- B. $\chi^2 = 315.36$
- C. $\chi^2 = 0.355$
- D. $\chi^2 = 1101.94$
- E. $\chi^2 = 0.6322$

14. Section 8.5; Problem 2 (p-value, conclusion)

- A. $p = 0.9965$; RH_o (Observed Values do not match Expectation)
- B. $p = 0.9860$; FRH_o (Observed Values match Expectation)
- C. $p = 0.9965$; FRH_o (Observed Values match Expectation)
- D. $p = 0.9860$; RH_o (Observed Values do not match Expectation)
- E. $p = 0.0035$; RH_o (Observed Values do not match Expectation)

15. Section 8.6; Problem 2 (Test Statistic)

- A. $\chi^2 = 1.976$
- B. $\chi^2 = 1.849$
- C. $\chi^2 = 0.769$
- D. $\chi^2 = 1.641$
- E. $\chi^2 = 0.683$

16. Section 8.6; Problem 2 (p-value; conclusion)

- A. $p = 0.2002$; RH_o (Observed Values do not match Expectation)
- B. $p = 0.1958$; FRH_o (Observed Values match Expectation)
- C. $p = 0.2002$; FRH_o (Observed Values match Expectation)
- D. $p = 0.1958$; RH_o (Observed Values do not match Expectation)
- E. $p = 0.3723$; RH_o (Observed Values do not match Expectation)

17. Previous studies on sleep tendencies report that, on average, an adult American will sleep for 6 hours each night with a standard deviation of 0.75 hours. You survey a SRS of 100 adult Americans and determine that the mean sleep time is 5 hours. Which Hypothesis Test should be used here?

18. Previous studies on sleep tendencies report that 65% of adult Americans do not get the recommended amount of nightly sleep. You survey a SRS of 100 adult Americans and determine that 78% do not get the recommended amount of nightly sleep. Which Hypothesis Test should be used here?

19. A previous study on sleep tendencies report that 15% of adult Americans are significantly sleep deprived, 35% are sleep deprived, 25% sleep an appropriate amount, 15% oversleep a slight amount, and 10% significantly oversleep. To confirm these results, you survey a SRS of 100 adult Americans to and find that 28 are significantly sleep deprived, 42 are sleep deprived, 21 get an appropriate amount of sleep, 7 oversleep, and 2 sleep excessively too much. Which Hypothesis Test should be used here?

Answer Choices for Questions 17, 18, and 19:

- A. One-sample t-test for means
- B. One-sample z-test for means
- C. One sample z-test for proportions
- D. One sample t-test for proportions
- E. Chi-squared goodness of fit test

20. A certain retail store bases its staffing on the number of customers that arrive during certain time slots. Based on prior experience this store expects 32% of its customers between 8:00 am and 12:00 pm; 21% of its customers between 12:00 pm and 4:00 pm; 35% of its customers between 4:00 pm and 8:00 pm; and 12% of its customers between 8:00 pm and midnight. On a certain day, the store had 214, 198, 276, and 134 customers in those time slots, respectively. Should the store change its staffing? (Consider an alpha of 0.05.)

Proposed Solution:

H_0 : The expected values match the observed values

H_a : The expected values do not match the observed values

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assign("exp",c(32,21,35,12))
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assign("obs",c(214,198,276,134))
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sum((obs-exp)^2/exp) = 5426.773
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1-pchisq(5426.773,3) = 0
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$p < \alpha$, therefore RH_0 : the store should change its staffing.

What was wrong with the proposed solution?

- A. In the calculation of χ^2 , observed quantities should be subtracted from expected quantities.
- B. Expected values were given as percentages and were handled in the formula as quantities.
- C. The degrees of freedom should match the number of categories, in this case, 4.
- D. This is not the correct method to test a hypothesis of this nature.
- E. There is nothing wrong with the proposed solution.