review Day 2and 3

LAYING
the
FOUNDATION

Practice Questions related to inference

due tomorrow →

Multiple Choice Questions on Inference

1. A study found that 63 of 211 randomly selected men and 130 out of 651 randomly selected women prefer cats to dogs. You want to test the hypothesis that women like cats more. Choose the correct hypotheses and pooled $\hat{p}$.

(A)	H_0: $p_M = p_F$;	H_A: $p_M < p_F$;	$\hat{p} = .224$
(B)	H_0: $p_M = p_F$;	H_A: $p_M > p_F$;	$\hat{p} = .249$
(C)	H_0: $p_M = p_F$;	H_A: $p_M < p_F$;	$\hat{p} = .249$
(D)	H_0: $p_M = p_F$;	H_A: $p_M > p_F$;	$\hat{p} = .224$
(E)	H_0: $p_M < p_F$;	H_A: $p_M > p_F$;	$\hat{p} = .224$

2. An independent testing lab obtained random samples of new halogen bulbs and standard incandescent bulbs made by the same company to establish the company's claim that, on average, the halogen bulb lasts longer than the incandescent one. Which test would you use?

(A) a matched pair t test
(B) a t-test for the difference in two means
(C) a z-test for the difference in two proportions
(D) a t-test for the slope of the regression line
(E) a χ^2-test for homogeneity

3. A certain population follows a normal distribution with mean μ and standard deviation σ. You construct a 95% confidence interval for μ and find it to be 1.1 ± 0.9. Which of the following is true?

(A) In a test of the hypotheses H_0: $\mu=1.2$, H_A: $\mu \neq 1.2$, H_O would be rejected at the .05 level.
(B) In a test of the hypotheses H_0: $\mu=1.9$, H_A: $\mu \neq 1.9$, H_O would be rejected at the .05 level.
(C) In a test of the hypotheses H_0: $\mu=1.9$, H_A: $\mu \neq 1.9$, H_O would be rejected at the .025 level.
(D) In a test of the hypotheses H_0: $\mu=0$, H_A: $\mu \neq 0$, H_O would be rejected at the .05 level.
(E) A conclusion about hypotheses cannot be made from a confidence interval.

4. Which of the following is a condition for choosing a *t*-interval rather than a *z*-interval when constructing a confidence interval for the mean of a population?

    (A) The standard deviation of the population is unknown.
    (B) There is an outlier in the sample data.
    (C) The sample may not have been a simple random sample.
    (D) The population is not normally distributed.
    (E) The data are linked so a matched-pairs test is necessary.

5. You want to see whether or not high school changes children's educational plans. You take a random sample of 6th graders and of 12th graders and ask them whether they plan to get a job right after high school, go to college, or get an advanced degree. Which test do you perform?

    (A) a χ^2 test for homogeneity
    (B) a two-sample *z*-test for proportions
    (C) a matched pair *t*-test
    (D) a χ^2 test for goodness of fit
    (E) a *t*-test for the slope of the regression line

6. The Centers for Disease Control report a survey of randomly chosen Americans age 45 and older, which found that 51 of 100 men and 80 of 782 women suffered from some form of arthritis. You want to estimate the difference in the proportions of men and women over 45 who have arthritis with a 95% confidence interval. What standard error will you use?

    (A) 0.0192
    (B) 0.0378
    (C) 0.0511
    (D) 0.1485
    (E) 1.96

7. A two-sided hypothesis test for a population mean is significant at the 1% level of significance. Which of the following is necessarily true?

    (A) The 99% confidence interval of the mean contains 0.
    (B) The 99% confidence interval of the mean does not contain 0.
    (C) The 99% confidence interval of the mean contains the hypothesized mean.
    (D) The 99% confidence interval of the mean does not contain the hypothesized mean.
    (E) The 99% confidence interval is not useful here.

8. Which of the following is **not** a characteristic of the χ^2 distribution?

(A) Its shape is based on the sample size.
(B) It is skewed to the right.
(C) It approaches a normal distribution as the degrees of freedom increase.
(D) It can never take on negative values.
(E) It is always used for one-sided significance tests.

9. Which of the following would be the most appropriate for measuring the association between gender and favorite color based on a random sample of subjects?

(A)   a two-sample t-test
(B)   a correlation coefficient
(C)   a χ^2-test for independence
(D)   a one-sample z-test for a proportion
(E)   a t-test for the slope of the regression line

10. Sixty senior account executives were classified into three groups, labeled A, B, and C. There were 26 in group A, 19 in group B and 15 in group C. At the .05 significance level, we would like to test if is it reasonable to conclude that the proportion of the population that falls into each group is the same. Which of the following is a correct conclusion?

(A) Reject H_0. The proportion in the three groups is not significantly different.
(B) Reject H_0. The proportion in the three groups is not the same.
(C) Do not reject H_0. The proportion in the three groups is not significantly different.
(D) Do not reject H_0. The proportion in the three groups is not the same.
(E) We cannot perform a significance test because there are three groups.

Use the following information to answer questions 11 and 12.
A one sample t test yields a t statistic of 2.089. The sample size was 16.

11. The alternative hypothesis was in the form $H_a : \mu > 37.5$. Is there significant evidence at the $\alpha = .05$ level to reject the null hypothesis?

(A) No, because the P-value is between 0.05 and 0.10.
(B) No, because the P-value is between 0.025 and 0.05.
(C) No, because the sample mean was significantly above 37.5.
(D) Yes, because the P-value is between 0.05 and 0.10.
(E) Yes, because the P-value is between 0.025 and 0.05.

12. If the alternative hypothesis was $H_a : \mu \neq 37.5$ instead, would you reject the null hypothesis at the $\alpha = 0.05$ level?

(A) No, because the P-value is between 0.05 and 0.10.
(B) No, because the P-value is between 0.025 and 0.05.
(C) No, because the sample mean was significantly above 37.5.
(D) Yes, because the P-value is between 0.05 and 0.10.
(E) Yes, because the P-value is between 0.025 and 0.05.

Free Response Questions on Inference

1.   A fitness trainer wants to know if her weight-lifting program can quickly improve upper body strength in older people. To find out, she has a group of randomly selected people over 55 years old do push-ups for 90 seconds and counts the number each can do. After these people participate in her weightlifting program for 3 weeks, she tests them again in the same way. Here are the results:

Person	1	2	3	4	5	6	7	8	9	10	11	12
Before	15	12	21	22	17	19	10	25	12	17	8	19
After	17	15	22	22	21	24	11	28	14	16	12	21

Does the program help?

2.   There are two main dog parks in Dallas, one near White Rock Lake and one near downtown. The downtown dog park is smaller and is located underneath several highway overpasses. There are many apartments, townhomes, and lofts nearby. The White Rock Lake dog park is larger and provides a place for dogs to swim in the lake. The neighborhoods nearby are a mix of single family homes with some apartments. Jessica believes that since the downtown dog park is near many apartments, many of the dogs there will be smaller breeds, while the White Rock Lake park will attract larger, more active breeds. In order to test this assertion, she chooses random times during a month to visit each park. She categorizes the dogs there by size.

	Toy (< 10 lbs)	Small (11 – 20 lbs)	Medium (21-50 lbs)	Large (51-100 lbs)	Giant (over 100 lbs)
Downtown	39	72	101	89	12
White Rock Lake	77	158	188	275	51

Does the breed distribution for the downtown dog park differ significantly from the White Rock Lake dog park at the $\alpha = 0.05$ level?