Q11 #9

An ammunition producer claims his best product has an average lifespan of exactly 18 years. A skeptical product evaluator asks for evidence (data) that might be used to evaluate this claim. The product evaluator was provided data collected from a random sample of 50 people who used the product. Using the data, an average product lifespan of 15 years and a standard deviation of 8 years was calculated. Select the 90%, confidence interval for the true mean lifespan of this product.

s

$n = 50$

sample $\bar{x}$

$t^* = \text{invT}(.95, 49)$

$= 1.676551$

$15 \pm t^* \, s/\sqrt{n}$

$15 \pm (1.676551) \, 8/\sqrt{50}$

15 ± 1.897

$[13.1, 16.9]$

population st. dev. $\Rightarrow z$

sample st. dev $\Rightarrow t$

Public Page

pt ⇒ tcdf

$P(t < \#) = pt(\#, df)$

Q12 #8

Let x represent the hemoglobin count (HC) in grams per 100 milliliters of whole blood. The distribution for HC is approximately normal with $\mu = 14$ for healthy adult women. Suppose that a female patient has taken 12 laboratory blood samples in the last year. The HC data sent to her doctor is listed below. We would like to know if the data indicates this patient has significantly high HC compared to the population.

(19, 14, 23, 20, 15, 19, 21, 16, 18, 18, 16, 21)

Give the p-value and interpret the results.

$\mu = 14$

$n = 12$

one sample t-test

```
> hc=c(19,14,23,20,15,19,21,16,18,18,16,21)
> mean(hc)
[1] 18.33333
> sd(hc)
[1] 2.708013
```

$\leftarrow \bar{x}$

$\leftarrow s$

$H_0: \mu = 14$

$H_a: \mu > 14$

$$t = \frac{18.33 - 14}{2.708/\sqrt{12}} = \_\_\_$$

$$p(t > \_\_\_) = \underbrace{\quad\quad}_{\text{pvalue}}$$

$< \alpha \Rightarrow$ reject H_0

$> \alpha \Rightarrow$ fail to reject H_0

ehw10

14. A 95% confidence interval for the mean reading achievement score for a population of third-grade students is (44.2, 54.2). The margin of error of this interval is

a. 5
b. 5%
c. 2.5
d. 54.2
e. cannot be determined

(width of interval = 10)

$$\bar{X} = \frac{44.2 + 54.2}{2} = 49.2$$

$$49.2 \pm 5$$

margin of error

ehw12

2 proportion z test.

7. Do you have an insatiable craving for chocolate or some other food? Since many North Americans apparently do, psychologists are designing scientific studies to examine the phenomenon. According to the New York Times (Feb. 22, 1995), one of the largest studies of food cravings involved a survey of 1000 McMaster University (Canada) students. The survey revealed that 97% of the women in the study acknowledged specific food cravings while only 67% of the men did. Assume that 600 of the respondents were women and 400 were men. Is there sufficient evidence to claim that the true proportion of women who acknowledge having food cravings exceed the corresponding proportion for men?

$H_0: p_w = p_m$

$H_a: p_w > p_m$

a) No. Since the p-value is so large, there is no statistical evidence to reject the null hypothesis of no difference in population proportion of food cravings based on gender.

b) Yes. Since the p-value is so small, there is statistical evidence to reject the null hypothesis of no difference between gender population proportions of food cravings.

c) The sample size is insufficient to perform a hypothesis test.

d) No. Since the p-value is greater than alpha (0.05), there is no statistical evidence to reject the null hypothesis of population proportion women food cravings is greater than men food cravings

e) Yes. Since the p-value is less than alpha (0.05), there is statistical evidence to reject the alternative hypothesis that population proportion of women food cravings is larger than men food cravings.

$\hat{p}_w = .97 \quad 600$

$\hat{p}_m = .67 \quad 400$

$$Z = \frac{.97 - .67}{\sqrt{\frac{.97(.03)}{600} + \frac{.67(.33)}{400}}}$$

$p(Z > \underline{\quad})$

8.4

4. Data taken from a random sample of 60 students chosen from the student population of a large urban high school indicated that 36 of them planned to pursue post-secondary education. An independent random sample of 50 students taken at a neighboring large suburban high school resulted in data that indicated that 31 of those students planned to pursue post-secondary education. Do these data provide sufficient evidence at the 5% level to reject the hypothesis that these population proportions are equal?

1

2

$H_0: p_1 = p_2$

$H_a: p_1 \neq p_2$

$\hat{p}_1 = \frac{36}{60}$ $\hat{p}_2 = \frac{31}{50}$

2 prop z test

Q 11

Question 2

The gas mileage for a certain model of car is known to have a standard deviation of 4 mi/gallon. A simple random sample of 81 cars of this model is chosen and found to have a mean gas mileage of 27.5 mi/gallon. Construct a 95% confidence interval for the mean gas mileage for this car model.

$\sigma = 4$

$n = 81$

$\bar{x}$

use z^*

$$27.5 \pm 1.96 \frac{4}{\sqrt{81}}$$

Q12 #6

$\swarrow p$

Based on information from a large insurance company, 67% of all damage liability claims are made by single people under the age of 25. A random sample of 52 claims showed that 43 were made by single people under the age of 25. Does this indicate that the insurance claims of single people under the age of 25 is higher than the national percent reported by the large insurance company? Give the test statistic and your conclusion.

$\hat{p} = 43/52$

a) z = 2.407; reject H_o at the 5% significance level

b) z = 2.407; fail to reject H_o at the 5% significance level

c) z = 1.907; reject H_o at the 5% significance level

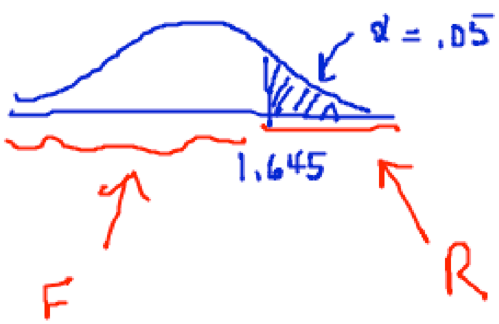
d) z = -1.907; fail to reject H_o at the 5% significance level

e) z = -2.407; reject H_o at the 5% significance level

$H_o: p = .67$

$H_a: p > .67$

$$z = \frac{43/52 - .67}{\sqrt{\frac{.67(1-.67)}{52}}} = \boxed{}$$



$p(z > \boxed{}) =$

$< \alpha$ Reject

$> \alpha$ Fail to reject

2 tailed test H_a $\neq$

pvalue: $2 \cdot p($ t or z < if test stat is negative $)$

$2 \cdot p($ t or z > if test stat is positive $)$

Q12 #3

It is believed that the average amount of money spent per U.S. household per week on food is about \$98, with standard deviation \$10. A random sample of 100 households in a certain affluent community yields a mean weekly food budget of \$100. We want to test the hypothesis that the mean weekly food budget for all households in this community is higher than the national average. State the null and alternative hypotheses for this test.

μ σ

$n = 100$ $\bar{x} = 100$

a) H_o: $\mu = 98$, H_a: $\mu < 98$

b) H_o: $\mu = 100$, H_a: $\mu > 100$

c) H_o: $\mu = 100$, H_a: $\mu < 100$

d) H_o: $\mu = 98$, H_a: $\mu \neq 98$

e) H_o: $\mu = 98$, H_a: $\mu > 98$

$H_0: \mu = 98$

$H_a: \mu > 98$

One sample mean z test

Q11 #10

An important problem in industry is shipment damage. A pottery producing company ships its product by truck and determines that it cannot meet its profit expectations if, on average, the number of damaged items per truckload is greater than 11. A random sample of 15 departing truckloads is selected at the delivery point and the average number of damaged items per truckload is calculated to be 11.3 with a calculated sample of variance of 0.64. Select a 90% confidence interval for the true mean of damaged items.

a) [10.68, 11.92]

b) [10.64, 11.36]

c) [53.67, -33.86]

d) [-0.3635, 0.3635]

e) [10.04, 11.66]

$n = 15$ $\bar{x} = 11.3$ $s^2 = .64$ $s = .8$

90% CI

$$11.3 \pm t^* \frac{.8}{\sqrt{15}}$$

$$t^* = \text{invT}(.95, 14)$$

8T

8.1

12. From earlier records, Company A knows that a small electric motor that it produces has a mean life in continuous use of 28.5 hours with a standard deviation of 2.1 hours. Company B plans to investigate whether its motor exceeds this average life by testing a random sample of 50 motors. What is the minimum mean life that these sample motors must have so that a one-sided z-test will provide evidence at the 5% level that the motors produced by Company B have a longer life than those of Company A?

$\mu_A = 28.5$

$\sigma_A = 2.1$ ← one sample mean z test

$n = 50$

$H_0: \mu = 28.5$

$H_a: \mu > 28.5$

$$z = \frac{\bar{x} - 28.5}{2.1/\sqrt{50}} > 1.645$$

$$\bar{x} - 28.5 > 1.645\left(\frac{2.1}{\sqrt{50}}\right)$$

8.2

6. A reader wrote in to the opinion column of a sports magazine to say that his grandfather told him that in $\boxed{3/4}$ of all baseball games, the winning team scores more runs in one inning than the losing team scores in the entire game. ~~(This phenomenon is known as a "big bang.")~~ The columnist responded that this proportion seemed to be too high to be believable. An SRS of 190 Major League Baseball games was examined and 98 of them contained the "big bang." Test the claim at the 5% significance level.

p

$p = .75$

$\leftarrow n = 190$

$\hat{p} = \frac{98}{190}$

$H_0: p = .75$

$H_a: p < .75$

-1.645

$$z = \frac{98/190 - .75}{\sqrt{\frac{.75(1-.75)}{190}}} = \boxed{}$$

pvalue: $p(z < \boxed{})$

$< \alpha \Rightarrow$ Reject H_0

$> \alpha \Rightarrow$ FR H_0

6. Solid fats are more likely to raise blood cholesterol levels than liquid fats. Suppose a nutritionist analyzed the percentage of saturated fat for a sample of 6 brands of stick margarine (solid fat) and for a sample of 6 brands of liquid margarine and obtained the following results:

1	Stick	25.8	26.9	26.2	25.3	26.7	26.1
2	Liquid	16.9	17.4	16.8	16.2	17.3	16.8

find $\bar{x}_1$ + $\bar{x}_2$

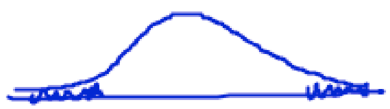
s_1 + s_2

Is there a significant difference in the average amount of saturated fat in solid and liquid fats?

$H_0: \mu_1 = \mu_2$

$H_a: \mu_1 \neq \mu_2$

2 sample t-test



$$t = \frac{(\bar{x}_1 - \bar{x}_2) - 0}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

8.5 #2

$n = 317$

find expected counts by multiplying each % to 317

then $\chi^2 = \sum \frac{(O-E)^2}{E}$

rest is like Wed. notes

Q12#12

An auditor for a hardware store chain wished to compare the efficiency of two different auditing techniques. To do this he selected a sample of nine store accounts and applied auditing techniques A and B to each of the nine accounts selected. The number of errors found in each of techniques A and B is listed in the table below:

Errors in A	Errors in B
25	11
28	17
26	19
28	17
32	34
30	25
29	29
20	21
25	30

diff. A - B

one tailed

$H_0: \mu_D > 0$

subtract 1st then find mean & sd.

Does the data provide sufficient evidence to conclude that the number of errors in auditing technique A is greater than the number of errors in auditing technique B at the 0.1 level of significance? Select the [Rejection Region, Decision of Reject (RH_0) or Failure to Reject (FRH_0)]. (Hint: the samples are dependent)

a) [t < -1.4 or -t < -1.4, RHo]

b) [t > 1.4, RHo]

c) [-t < 1.4 and t < 1.4, RHo]

d) [z < -1.4 and -z < -1.4, FRHo]

e) [t < -1.4, FRHo]

f) None of the above

no population s.d. given so t-test

$$t = \frac{\bar{x}_D - 0}{s/\sqrt{9}}$$