COLLECTED ON TEST DAY

Review for Chapter 6 Test

Name TEACHER

Solve each problem. Show your work, especially your set-ups. If you use a graphing calculator function, state which one.

1) Given the same sample statistics, which level of confidence will produce the narrowest confidence interval?

A) 85% B) 90% C) 75% D) 95%

2) Find the critical value z_c that corresponds to a 95% confidence level.

± 1.96

3) A random sample of 150 students has a grade point average with a standard deviation of 0.78. Find the margin of error if c = 0.98 and the sample mean is 75.

E = 0.15 $2.33\left(\frac{.78}{\sqrt{150}}\right) = \boxed{.148}$

4) A random sample of 40 students has a mean annual earnings of \$3120 and a standard deviation of \$677. Construct the confidence interval for the population mean, μ if c = 0.95.

(\$2910, \$3330)

$E = z \frac{s}{\sqrt{n}}$

$E = 1.96\left(\frac{677}{\sqrt{40}}\right) = \pm 210$

5) In a recent study of 84 eighth graders, the mean number of hours per week that they watched television was 23.5 with a standard deviation of 6.2 hours.

a) Find the 95% confidence interval of the mean.

$1.96\left(\frac{6.2}{\sqrt{84}}\right) = 1.32$

~~(21.3, 25.3)~~

(22.18, 24.82)

b) If the standard deviation is doubled to 12.4, what will be the effect on the confidence interval?

Widen the interval B/C Error ↑

(math

6) In order to set rates, an insurance company is trying to estimate the number of sick days that full time workers at an auto repair shop take per year. A previous study indicated that the standard deviation was 2.8 days. How large a sample must be selected if the company wants to be 95% confident that the true mean differs from the sample mean by no more than 1 day?

E 1.96

$n = \left(\frac{z_c S}{E}\right)^2$

31

$= \left(\frac{1.96 \times 2.8}{1}\right)^2 = 30.1$ Round ↑

7) The numbers of advertisements seen or heard in one week for 30 randomly selected people in the United States are listed below. Construct a 98% confidence interval for the true mean number of advertisements.

List 1
1 var stat

598	494	441	595	728	690	684	486	735	808
481	298	135	846	764	317	649	732	582	677
734	588	590	540	673	727	545	486	702	703

your sample mean = ~~603.03~~ 600.93 603 your sample standard deviation = ~~159.11~~ 159.53

$t_c = 2.462$

your confidence interval ~~(543.8, 658.0)~~ (529.2, 672.64)

2.462

use "t"

$E = t_c \frac{s}{\sqrt{n}}$ $E = 71.71$

$= 2.462\left(\frac{159.53}{\sqrt{30}}\right)$

8) Find the critical value, t_c for c = 0.99 and n = 10.

chart 3.250

tchart

9) Find the value of E, the margin of error, for c = 0.90, n = 16 and s = 2.3, if the sample mean is 10.

~~1.005~~ E = 1.01

$t_c\left(\frac{SD}{\sqrt{n}}\right) = E$ n−1 = 15

$\Rightarrow 1.75\left(\frac{2.3}{\sqrt{16}}\right) = 1.006$

10) In a random sample of 35 families, the average weekly food expense was $95.60 with a standard deviation of $22.50. Determine whether a normal distribution or a t-distribution should be used or whether neither of these can be used to construct a confidence interval. Assume the distribution of weekly food expenses is normally shaped.

YES A) Use a normal distribution. Z_c

NO ~~B) Use a t-distribution.~~

C) Neither a normal distribution nor a t-distribution can be used.

11) Construct a 95% confidence interval for the population mean, μ. Assume the population has a normal distribution. A random sample of 16 fluorescent light bulbs has a mean life of 645 hours with a standard deviation of 31 hours.

(tc)

(628.5, 661.5)

$E = 2.13\left(\frac{31}{\sqrt{16}}\right) = 16.51$ + 645, − 645

12) The grade point averages for 10 randomly selected high school students are listed below. Assume the grade point averages are normally distributed.

List 1
1 var stat

2.0 3.2 1.8 2.9 0.9 4.0 3.3 2.9 3.6 0.8

use t

Find a 98% confidence interval for the true mean.

your sample mean = 2.54 calc your sample standard deviation = 1.11 calc Sx

your confidence interval (1.55, 3.53)

$E = 2.82\left(\frac{1.11}{\sqrt{10}}\right) = .99$ + 2.54, − 2.54

$2.064\left(\frac{17}{\sqrt{25}}\right) = 7.02$

13) A manufacturer receives an order for fluorescent light bulbs. The order requires that the bulbs have a mean life span of 750 hours. The manufacturer selects a random sample of 25 fluorescent light bulbs and finds that they have a mean life span of 740 hours with a standard deviation of 17 hours. Test to see if the manufacturer is making acceptable light bulbs. Use a 95% confidence level. Assume the data are normally distributed.

add/sub from 740

~~(738.81, 751.19) contains 750 so good.~~

7.02

(732.98, 747.02) doesnt contain 750 so NOT good

14) A survey of 400 non-fatal accidents showed that 152 involved the use of a cell phone. Find a point estimate for p, the population proportion of non-fatal accidents that involved the use of a cell phone.

$p = .380$ $\hat{p} = \frac{152}{400}$

15) When 415 college students were surveyed, 175 said they own their car. Construct a 95% confidence interval for the proportion of college students who say they own their cars.

p formulas + Z chart

(0.374, 0.469)

$\hat{p} = .42$ $\frac{175}{415}$

$E = 1.96\sqrt{\frac{(.42)(.58)}{415}} = .047$ + .42, − .42

448.5

16) A researcher at a major hospital wishes to estimate the proportion of the adult population of the United States that has high blood pressure. How large a sample is needed in order to be 99% confident that the sample proportion will not differ from the true proportion by more than 4%?

$E = .04$

1024

1037

$n = (.5)(.5)\left(\frac{2.56}{.04}\right)^2 = 1024$

17) A state highway patrol official wishes to estimate the number of drivers that exceed the speed limit traveling a certain road.

a) How large a sample is needed in order to be 90% confident that the sample proportion will not differ from the true proportion by more than 4%?

423

$(.5)(.5)\left(\frac{1.64}{.04}\right)^2$

421

$\hat{p} = .65 \quad \hat{q} = .35$

b) Repeat part (a) assuming previous studies found that 65% of drivers on this road exceeded the speed limit.

385

383

$(.65)(.35)\left(\frac{1.64}{.04}\right)^2$

18) The USA Today claims that 44% of adults who access the Internet read the international news online. You want to check the accuracy of their claim by surveying a random sample of 120 adults who access the Internet and asking them if they read the international news online. Fifty-two adults responded "yes." Use a 95% confidence interval to test the newspaper's claim.

1.96

$\frac{52}{120} = .433 \; \hat{p}$

$\hat{q} = .567$

(.344, .522)

$E = 1.96\sqrt{\frac{(.433)(.567)}{120}}$

$E = .089$

44% is in the interval so support claim

19) Find the critical values, X^2_R and X^2_L, for c = 0.95 and n = 12.

Chi Chart

3.816 + 21.920

$\sqrt{\frac{(15-1)(13.7)^2}{26.119}}$

$\sqrt{\frac{(15-1)(13.7)^2}{5.629}}$

20) Construct a 95% confidence interval for the population standard deviation σ of a random sample of 15 men who have a mean weight of 165.2 pounds with a standard deviation of 13.7 pounds. Assume the population is normally distributed.

n

(10.0, 21.6)

$\boxed{\sqrt{\frac{(n-1)s^2}{X^2_R}} < \sigma^2 < \sqrt{\frac{(n-1)s^2}{X^2_L}}}$

X^2_R EASY

$10 < \sigma^2 < 21.6$

$X^2_L = \frac{1+c}{2} = \frac{1+.95}{2} = .975$

chart 5.629

$X^2_R = \frac{1-c}{2} = .025$ chart

26.119

21) The heights (in inches) of 20 randomly selected adult males are listed below. Construct a 99% confidence interval for the variance, σ^2. Assume the population is normally distributed.

70	72	71	70	69	73	69	68	70	71
67	71	70	74	69	68	71	71	71	72

List 1
1-var Stat

$\chi^2_L = \frac{1+c}{2}$ chart $\to$ 6.844

$\chi^2_R = \frac{1-c}{2}$ chart $\to$ 38.589

your sample mean = 70.35 your sample standard deviation = 1.73

your confidence interval (1.47, 8.31)

same

$1.47 < \sigma^2 < 8.31$

$$\frac{(n-1)s^2}{\chi^2_R} < \sigma^2 < \frac{(n-1)s^2}{\chi^2_L}$$

$$\frac{(19)(1.73)^2}{38.589} < \sigma^2 < \frac{(19)(1.73)^2}{6.844}$$

22) A container of car oil is supposed to contain 1000 milliliters of oil. A quality control manager wants to be sure that the standard deviation of the oil containers is less than 20 milliliters. He randomly selects 10 cans of oil with a mean ~~of 997~~ milliliters and a standard deviation of 32 milliliters. Use these sample results to construct a 95% confidence interval for the true value of σ. Does this confidence interval suggest that the variation in the oil containers is at an acceptable level?

$\mu = 997$

(22.01, 58.42)

does not contain 20, not ~~acc~~ acceptable level

$$\sqrt{} < \sigma < \sqrt{}$$

df=9

$$\chi^2_L = \frac{1+c}{2} = \frac{1+.95}{2} = .975 \text{ chart} = 2.70$$

$$\chi^2_R = \frac{1-c}{2} = \frac{1-.95}{2} = .025 \Rightarrow 19.023$$

$$\sqrt{\frac{9(32)^2}{19.023}} < \sigma < \sqrt{\frac{9(32)^2}{2.7}}$$

$22.01 < \sigma < 58.42$

20 is not contained
not acceptable