chapter 7 MATH 160

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1) You randomly select and weigh 25 samples of ALAVERT, an allergy medicine. The *sample* standard deviation is 1.30 mg and the sample mean is 2.15 mg. Assuming the weights are normally distributed, construct a 95% confidence interval for the **population mean** of the weights for this particular brand of allergy medicine.

(Round your answer to the thousandths place.)

confidence interval for the **population mean μ** $\bar{X} - E < \mu < \bar{X} + E$

Use $E = t^* \left(\frac{s}{\sqrt{n}} \right)$ because σ the population standard deviation is not given.

To find "t" go to table A-3 using degrees of freedom = 24 and area in two tails = .05 obtained from taking 1 - .95 you will get t = 2.064

$E = t^* \left(\frac{s}{\sqrt{n}} \right) = 2.064^* \left(\frac{1.30}{\sqrt{25}} \right) = 0.53664$ Now plug this into the confidence interval

$\bar{X} - E < \mu < \bar{X} + E$

formula above $2.15 - .53664 < \mu < 2.15 + .53664$ Check answer on calculator by :

$1.61 < \mu < 2.69$

STAT → Tests , T - interval

2) DETERMINING SAMPLE SIZE: You want to estimate the percentage of U.S. statistics students who get grades of "B" or higher. How many students must you survey if you want 90% confidence that the sample percentage is off my no more than three percentage points (this means that the margin of error is .03) No other information is available.

Population standard deviation σ is not given and $\hat{p}$ is not given so from the three sample size formulas the only one that can be used is $n = \frac{z^2(0.25)}{E^2}$ where z = 1.645, E = .03 giving n = 751.67 which is rounded to 752

(Round using the round off rule for Sample Sizes)

Note: Even if the sample size n had been 751.001 you would round to 752

3) A sociologist develops a test to measure attitudes about public transportation, and 27 randomly selected subjects are given the test. Their mean score is 76.2 and their standard deviation is 21.4. Construct the 95% confidence interval for the standard deviation of the scores of all subjects. (Round your answer to the nearest thousandths)

Use table A-4 to find the critical values: Take 1-.95 = .05 then divide by 2 to get .025 this pairs up with .975 using degrees of freedom 26 you will get χ_L^2, χ_R^2

$$\sqrt{\frac{(n-1)s^2}{\chi_R^2}} < \sigma < \sqrt{\frac{(n-1)s^2}{\chi_L^2}}$$

$$\sqrt{\frac{(27-1)21.4^2}{41.923}} < \sigma < \sqrt{\frac{(27-1)21.4^2}{13.844}}$$

$$16.85 < \sigma < 29.33$$

4) Of 101 randomly selected adults, 34 were found to have high blood pressure. Construct a 95% confidence interval for the true percentage of all adults that have high blood pressure. (true percentage refers to the population proportion)

$\hat{p} - E < P < \hat{p} + E$ where $E = z^* \sqrt{\frac{\hat{p}\hat{q}}{n}}$ z = 1.96 and $\hat{p}$ =34/100 or .337 $\hat{q}$ = 1- $\hat{p}$ which is .663 put all of this information into the confidence interval

$$\hat{p} - E < P < \hat{p} + E$$

$$.337 - .092 < P < .337 + .092$$

$$0.24 < P < 0.43 \quad or \quad 24\% < P < 43\%$$

Check answer on calculator by : STAT → Tests, 1-prop Z INT

5) 43 packages are randomly selected from packages received by a parcel service. The sample has a mean weight of 12.5 pounds and a POPULATION standard deviation of 3.6 pounds. What is the 99 percent confidence interval for μ, the mean weight of all packages received by the parcel service?

confidence interval for the **population mean μ** $\bar{X} - E < \mu < \bar{X} + E$

Use $E = z^* \left(\frac{\sigma}{\sqrt{n}}\right)$ because σ the population standard deviation is given.

To find "z" go to table A-2 where z = 2.575

$E = z^* \left(\frac{\sigma}{\sqrt{n}}\right) = 2.575^* \left(\frac{3.6}{\sqrt{43}}\right) = 1.414$ Now plug this into the confidence interval

$$\bar{X} - E < \mu < \bar{X} + E$$

formula above $12.5 - 1.414 < \mu < 12.5 + 1.414$

$$11.086 < \mu < 13.914$$

Check answer on calculator by : STAT → Tests, Z - interval