100%

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- Please **show all your work clearly** for full credit.
- Points are assigned for the answer and the work shown.
- Please box your final answer.

(4 pts) 1. Find $z_{\alpha/2}$ for the 96% confidence interval.

$\frac{0.96}{2} = 0.48$

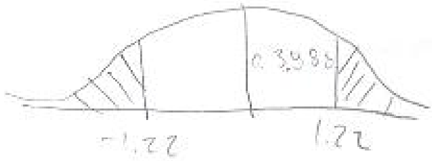
$\boxed{z_{\alpha/2} = 2.06}$

(4 pts) 2. Find $t_{\alpha/2}$ for the 95% confidence interval with $n = 10$.

95% $d.f = 10 - 1 = 9$

$\boxed{t_{\alpha/2} = 2.262}$

(4 pts) 3. Find the p-value for a two tailed test with observed $z = -1.22$.



$0.5 - 0.3888 = (0.1112)(2) = 0.2224$

$\boxed{p\text{-value} = 0.2224}$

(4 pts) 4. Find the p-value for a right-tailed test with observed $t = 1.948$ and $n = 18$.

$d.f = n - 1 = 18 - 1 = 17$

$\boxed{0.025 < p < 0.05}$

(9 pts) 5. True or False

a. A 90% confidence interval for μ is wider than a 95% confidence interval for μ. False

b. If the level of significance is made smaller, then the critical region becomes larger. False

c. A big p-value indicates that the observed value of the test statistic lies far away from the hypothesized value of μ. False

(6 pts) 6. A university dean wishes to estimate the average number of hours that freshmen study each week. The standard deviation from a previous study is 2.6 hours. How large a sample must be selected if he wants to be 99% confident of finding whether the true mean differs from the sample mean by 0.5 hour?

$\sigma = 2.6$ 99% $z_{\alpha/2} = 2.58$

$E = 0.5$

$n = \left(\frac{z_{\alpha/2}\,\sigma}{E}\right)^2 = \left(\frac{2.58 \cdot 2.6}{0.5}\right)^2 = 179.9$ $\boxed{n = 180}$

C

(10 pts) 7. A study of 415 kindergarten students showed that they have seen on average 5000 hours of television. The sample standard deviation is 900.

a. Find the best point estimate of the mean.

$\bar{x} = 5000 \rightarrow \boxed{\mu = 5000}$ C

b. Find the 95% confidence interval of the mean for all students.

$n = 415$

$\bar{x} = 5000$

$s = 900$

95% $z_{\alpha/2} = 1.96$ $E = z_{\alpha/2}\left(\frac{s}{\sqrt{n}}\right) = 1.96\left(\frac{900}{\sqrt{415}}\right) = 86.59$

$= 86.6$

$\bar{x} \pm E$ $\bar{x} - E = 4913.4$

$\bar{x} + E = 5086.6$

$\boxed{4913.4 < \mu < 5086.6}$ C

c. If a parent claimed that his children watched 4000 hours, would the claim be believable?

No, because the 4000 hrs does not fall in the confidence interval C

(7 pts) 8. A CBS News/ New York Times poll found that 329 out of 763 adults said they would travel to outer space in their lifetime, given the chance. Estimate the true proportion of adults who would like to travel to outer space with 92% confidence.

$n = 763$ 92% $\frac{0.92}{2} = 0.46$, $z_{\alpha/2} = 1.75$

$x = 329$

$E = z_{\alpha/2}\left(\sqrt{\frac{\hat{p}\hat{q}}{n}}\right) = (1.75)\left(\sqrt{\frac{(0.43)(0.57)}{763}}\right) = 0.031$

$\hat{p} = \frac{329}{763} = 0.43$

$\hat{p} \pm E$ $\hat{p} - E = 0.399$

$\hat{q} = 1 - 0.43 = 0.57$ $\hat{p} + E = 0.461$

$\boxed{0.399 < p < 0.461}$ C

0

(7 pts) 9. A recent study of 25 students showed that they spent an average of \$18.53 for gasoline per week. The standard deviation of the sample was \$3.00. Find the 95% confidence interval of the true mean.

$n = 25$, $\bar{x} = \$18.53$ $s = \$3.00$ d.f. $n-1 = 25-1 = 24$

95% $t_{\alpha/2} = 2.064$

$E = t_{\alpha/2}\left(\frac{s}{\sqrt{n}}\right) = 2.064\left(\frac{3}{\sqrt{25}}\right) = 1.24$

$\bar{x} \pm E$ $\bar{x} - E = 17.29$

$\bar{x} + E = 19.77$

$\boxed{17.29 < \mu < 19.77}$

(15 pts) 10. For each conjecture, state the null and alternative hypotheses:

a. The average age of community college students is 24.6 years.

claim: $\mu = 24.6$ $H_1: \mu \neq 24.6$ two tailed Test

opp: $\mu \neq 24.6$ $H_0: \mu = 24.6$

b. The average pulse rate of male marathon runners is less than 70 beans per minute.

Claim: $\mu < 70$ $H_1: \mu < 70$ left tailed test

opp: $\mu \geq 70$ $H_0: \mu \geq 70$

c. An attorney claims that more than 25% of all lawyers advertise.

Claim: $p > 0.25$ $H_1: p > 0.25$ right tailed test

opp: $p \leq 0.25$ $H_0: p \leq 0.25$

-0

(15 pts) 11. A physician claims that joggers' maximal volume oxygen uptake is greater than the average of all adults. A sample of 15 joggers has a mean of 40.6 milliliters per kilogram (ml/kg) and a standard deviation of 6 ml/kg. If the average of all adults is 36.7 ml/kg, is there enough evidence to support the physician's claim at α= 0.05?

$n = 15$

$\bar{x} = 40.6$

$s = 6$

a. Set up: Identify the original claim, opposite statement, the null hypothesis, and alternative hypothesis.

Claim: $\mu > 36.7$ $\qquad H_1: \mu > 36.7$ right tailed Test

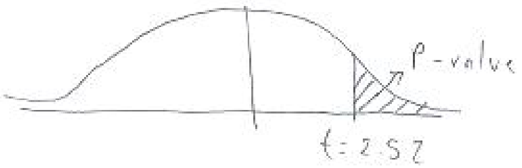
Opp: $\mu \le 36.7$ $\qquad H_0: \mu \le 36.7$

b. Compute the test statistic.

$n < 30$ t test

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}} = \frac{40.6 - 36.7}{6/\sqrt{15}} = \boxed{2.52}$$

c. Find P-value.



d.f $= n - 1 = 15 - 1 = 14$

$\boxed{0.01 < \text{p-value} < 0.025}$

d. Make the decision about the null hypothesis. Explain your reason clearly.

Is p-value ≤ 0.05?

Yes, reject the null hypothesis since the p-value is less than α

e. State the final conclusion that addresses the original claim.

There is enough information to support the claim that the maximal oxygen uptake is greater than the averge.

-0

Use traditional method

(15 pts) 12. In the Journal of the American Dietetic Association, it was reported that 54% of kids said that they had a snack after school. Test the claim that a random sample of 60 kids was selected and 36 said that they had a snack after school Use α= 0.01 and ~~the p-value method~~. On the basis of the results, should parents be concerned about their children eating a healthy snack?

a. Set up: Identify the original claim, opposite statement, the null hypothesis, and alternative hypothesis.

Claim: $p = 0.54$ $\qquad$ $H_1: p \neq 0.54$ two tailed test

Opp: $p \neq 0.54$ $\qquad$ $H_0: p = 0.54$

b. Compute the test statistic.

$n = 60$

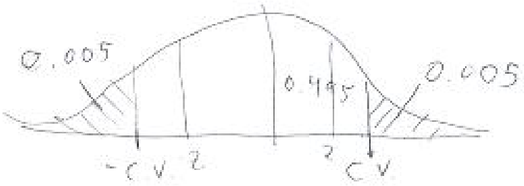
$x = 36$

$$Z = \frac{\hat{p} - p}{\sqrt{pq/n}} = \frac{0.6 - 0.54}{\sqrt{\frac{(0.54)(0.46)}{60}}} = \boxed{0.93}$$

$\hat{p} = \frac{36}{60} = 0.6$

$q = 1 - 0.54 = 0.46$

c. Find the critical value. $\alpha = 0.01$, $0.01/2 = 0.005$



$\boxed{C.V. = \pm 2.58}$

d. Make the decision about the null hypothesis. Explain your reason clearly.

Do not reject the null hypothesis because the Z value does not fall in the critical values

e. State the final conclusion that addresses the original claim.

There is not enough information to reject the claim.