Name: _____ Statistics Final Review

Confidence Intervals: (Unit 4)

1) Eight chemical elements do not have isotopes (different forms of the same element have the same atomic number but different atomic weights). A random sample of 30 of the elements which do have isotopes showed a mean number of 19.63 isotopes per element and the population a standard deviation of 18.73. Estimate the true mean number of isotopes for all elements with 90% confidence.

z

$n = 30$

$\bar{x} = 19.63$

$\sigma = 18.73$

90% → 1.65

$\bar{x} \pm z\left(\frac{\sigma}{\sqrt{n}}\right)$

$19.63 \pm 1.65\left(\frac{18.73}{\sqrt{30}}\right)$

19.63 ± 5.64

$13.99 < \mu < 25.27$

2) For a certain urban area in a sample of 5 months, on average 28 mail carriers were bitten by dogs each month. The standard deviation of the sample was 3. Find the 90% confidence interval of the true mean number of mail carriers who are bitten by dogs each month. Assume the variable is normally distributed.

t

$n = 5$

$\bar{x} = 28$

$s = 3$

90% → 2.312

$d.f = 4$

$\bar{x} \pm t\left(\frac{s}{\sqrt{n}}\right)$

$28 \pm 2.132\left(\frac{3}{\sqrt{6}}\right)$

28 ± 2.86

$25.14 < \mu < 30.86$

3) A U.S. Travel Data Center's survey of 1500 adults found that 42% of respondents stated that they favor historical sites as vacations. Find the 95% confidence interval of the true proportion of all adults who favor visiting historical sites as vacations.

$n = 1500$

$\hat{p} = .42$

$\hat{q} = .58$

95% → 1.96

$\hat{p} \pm z\sqrt{\frac{pq}{n}}$

$.42 \pm 1.96\sqrt{\frac{(.42)(.58)}{1500}}$

$.42 \pm .025$

$.395 < p < .445$

4) A random sample of 15 snowmobiles was selected, and the lifetime (in months) of the batteries was measured. The variance of the sample was 8.6. Find the 90% confidence interval of the true variance.

Honors only

$n = 15$

$s^2 = 8.6$

90% →

$x^2_{right} = 23.685$

$x^2_{left} = 6.571$

$\frac{(n-1)s^2}{x^2_{right}} < \sigma^2 < \frac{(n-1)s^2}{x^2_{left}}$

$\frac{14(8.6)}{23.685} < \sigma^2 < \frac{14(18.6)}{6.571}$

$5.08 < \sigma^2 < 18.32$