Benjamin Walter **cve303**
Assignment Confidence_Intervals due 04/22/2019 at 08:00pm EEST

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1. **(1 point)** `METUNCC/Statistics/CI_z.pg`
For the problems below, you may either enter a numeric answer (accurate to 3 significant digits), or the R code which generates the answer.
(Your answer will be checked by R.)

A random variable is sampled 42 times yielding sample mean $\bar{x} = 37$ and sample standard deviation $s = 6.6$.

What is α for the 93% confidence interval?
$\alpha =$ ____

What is $z_{\alpha/2}$ for the 93% confidence interval?
$z_{\alpha/2} =$ ________

Give the 93% confidence interval.
$\Big($ ____________ , ____________ $\Big)$

You may use the embedded R window below to check your code and perform computations.

Embedded R window.

Recall that if $Z \sim \text{Normal}(0,1)$ then the critical values of Z are computed in R by the command:
$z_\alpha == -\text{qnorm}(\alpha)$
For example
$-\text{qnorm}(.05)$ computes the critical value $z_{5\%}$ where $\text{P}\big(Z > z_{5\%}\big) == 5\%$.

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2. **(1 point)** `METUNCC/Statistics/CI_t.pg`
For the problems below, you may either enter a numeric answer (accurate to 3 significant digits), or the R code which generates the answer.
(Your answer will be checked by R.)

A normal random variable is sampled 15 times yielding sample mean $\bar{x} = 33$ and sample standard deviation $s = 9.4$.

What is α for the 97% confidence interval?
$\alpha =$ ____

How many degrees of freedom are there for the t distribution computation?
degrees of freedom = ____

What is $t_{\alpha/2}$ for the 97% confidence interval?
$t_{\alpha/2} =$ ________

Give the 97% confidence interval.
$\Big($ ____________ , ____________ $\Big)$

You may use the embedded R window below to check your code and perform computations.

Embedded R window.

Recall that if $T \sim \text{t}(n)$ (i.e. t-distribution with n degrees of freedom) then the critical values of T are computed in R by the command:
$t_\alpha == -\text{qt}(\alpha, n)$

For example
$-\text{qt}(.05,\ 9)$ computes the critical value $t_{5\%}$ where $\text{P}\big(T > t_{5\%}\big) == 5\%$, and T has 9 degrees of freedom.

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3. **(1 point)** `METUNCC/Statistics/CI_p.pg`
For the problems below, you may either enter a numeric answer, or the R code which generates the answer.
(Your answer will be checked by R.)

Theory: Suppose that $X \sim \text{Binomial}(n,\ p)$. If n is big and $p, q \geq \frac{10}{n}$ then X and $\hat{P} = \frac{X}{n}$ are approximately normal:
$X \approx \text{Normal}\Big(\ \_\_\_\ ,\ \_\_\_\_\ \Big)$
$\hat{P} \approx \text{Normal}\Big(\ \_\_\_\ ,\ \_\_\_\_\ \Big)$

Application: A sample of size 39 is drawn from a population, finding 21 occurrences.
What is the sample proportion?
$\hat{p} =$ ___
What is the standard error of the sample proportion?
$\sigma_{\hat{p}} =$ _________
Give the 90% confidence interval for the population proportion p.
(___________ , ___________)
If the total population is 85000, then what is the 90% confidence interval for the total number of occurrences?
(_______________ , _______________)

You may use the embedded R window below to check your code and perform computations.

Embedded R window.

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4. **(1 point)** `METUNCC/Statistics/CI_x.pg`
For the problems below, you may either enter a numeric answer (accurate to 3 significant digits), or the R code which generates the answer.
(Your answer will be checked by R.)

A normal random variable is sampled 25 times yielding sample standard deviation $s = 6$.
Give the 96% confidence interval for σ.
(_____________ , _____________)

You may use the embedded R window below to check your code and perform computations.

Embedded R window.

Recall that if $X \sim \chi^2(n)$ ("Chi-squared with n degrees of freedom") then the critical values of X are computed in R by the command:
$\chi_\alpha \ == \ \text{qchisq}\big(\alpha, n\big)$
For example
$\text{qchisq}(.05,\ 9)$ computes the critical value $\chi_{5\%}$ where $\text{P}\big(X < \chi_{5\%}\big) == 5\%$, and X has 9 degrees of freedom.