Standard Normal vs. t-Distribution

Is population standard deviation (σ) known?

Yes

* Use Standard Normal

$$E = z_c\left(\frac{\sigma}{\sqrt{n}}\right)$$

* If normally distributed

or

* $n \geq 30$

No

* Use t-distribution

$$E = t_c\left(\frac{s}{\sqrt{n}}\right)$$

$$df = n-1$$

* If normally distributed

or

* $n \geq 3$

EX:

* You randomly select 25 newly constructed houses. The sample mean construction cost is $181,000, and the population standard deviation is $28,000. Assuming construction costs are normally distributed, should you use the standard normal distribution, the t-distribution, or neither to construct a 95% confidence interval for the population mean construction cost? Explain.

$n = 25$

Normally Distributed

$\sigma = 28{,}000$

* Use standard normal because σ is known

EX:

* You randomly select 18 adult male athletes and measure the resting heart rate of each. The sample mean heart rate is 64 beats per minute, with a sample standard deviation of 2.5 beats per minute. Assuming the heart rates are normally distributed, should you use the standard normal distribution, the t-distribution or neither to construct a 90% confidence interval for the population mean heart rate? Explain.

$n = 18$

Normally distributed

$s = 2.5$

* Use t-distribution because $\underline{s}$ is known