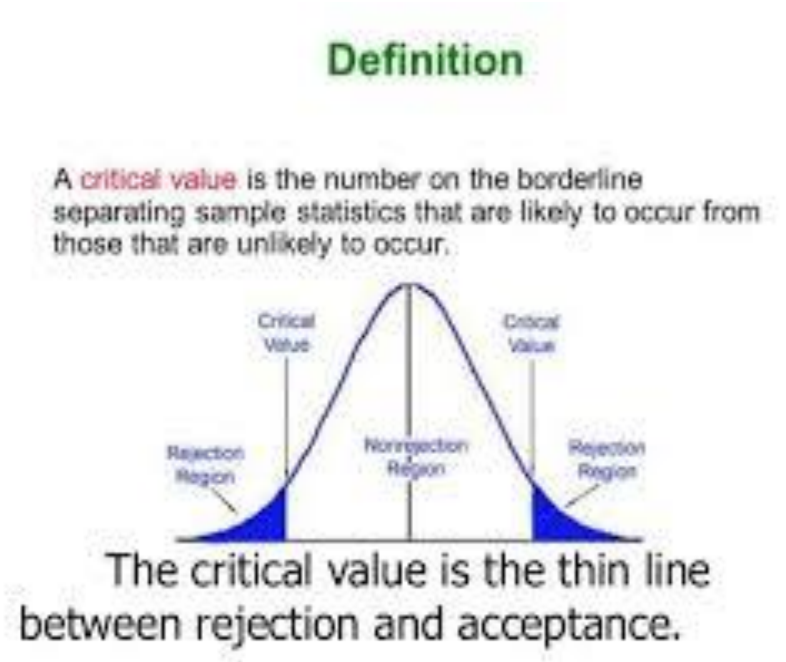
6.2
Confidence Intervals for the Mean (with unknown σ)

The t-Distribution

- Used to construct a ____________________ for a population ____________ when the ______________ ______________________ is ____________ known.
- Critical values are _______:



Properties of the t-Distribution

* 1) The ____ are equal to ________________.
* 2) ______________________________ and ______________________________ about the ________________.
* 3) __________________ under the curve equals _______________.
* 4) ____________________ are _____________________ than in the standard normal distribution.

Cont.

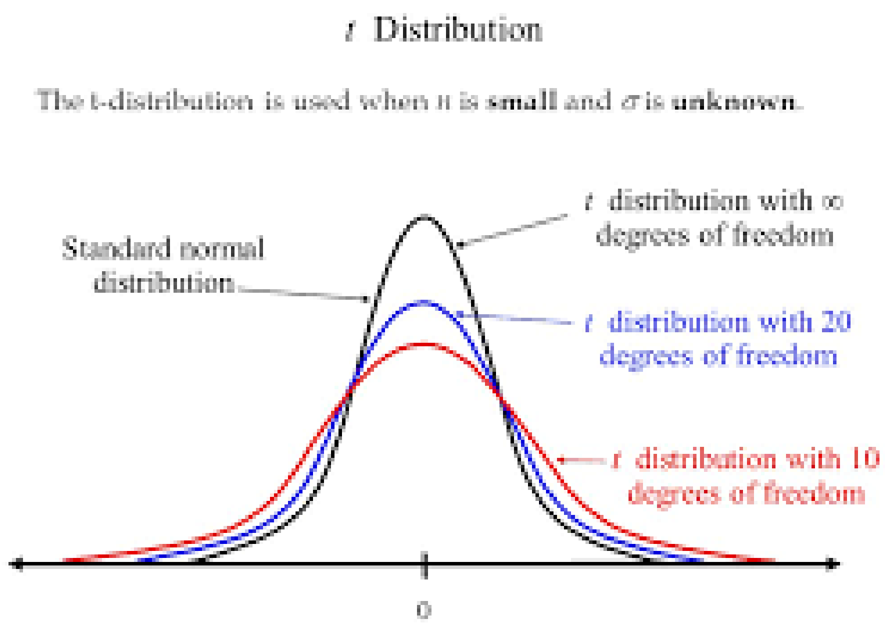
* 5) ______________________________ is greater than _______________________.
* 6) Family of ________________________ determined by the ____.
  * The _______________________ of ____ left after a sample statistic is calculated.
  * D.f. = ________________________

Cont.

* Degrees of freedom illustration:
  * 25 Students in a class
  * 25 Chairs in the classroom
  * Each of the first ________________________ to enter the classroom has a ____________________ as to which chair they will sit in. There is ________________________ or ___________________, however, for the ______________ student who enters the room.

Cont.

* 7) As the degrees of freedom ____________________, the t-distribution approaches the ____________________ ____.



EX:

* Find the critical value t_c for a 95% confidence level when the sample size is 15.

EX:

* Find the critical value t_c for a 90% confidence level when the sample size is 22.

Constructing a Confidence Interval for a Population Mean (σ unknown)

* 1) Find the ______________________________:

* 2) Identify the __________________________, the _________________________________, and the ______________________________:

Cont.

* 3) Find the ______________________________:

* 4) Find ____________________ by _______________ and ___________________________ to the sample ______________________:

EX:

- You randomly select 16 coffee shops and measure the temperature of the coffee sold at each. The sample mean temperature is 162.0 F with a sample standard deviation of 10.0 F. Construct a 95% confidence interval for the population mean temperature of coffee sold. Assume the temperatures are approximately normally distributed.

EX:

* You randomly select 36 cars of the same model that were sold at a car dealership and determine the number of days each car sat on the lot before it was sold. The sample mean is 9.75 days, with a sample standard deviation of 2.39 days. Construct a 99% confidence interval for the population mean number of days the car model sits on the lot.

Standard Normal vs. t-Distribution

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.

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.