**Colorado Technical University**

 **Course:** MATH366 – Probability and Statistics

#### Unit 9 Part 18 Readings: Sampling Distributions

#### and Confidence Intervals

**Sampling distribution of a sample statistic** -

 you have a population with an (unknown) parameter (ex: pop mean *μ*)

 you take a sample from that population and calculate the statistic

(ex: sample mean x̄)

 you take another sample and calculate another mean x̄

 and another…

 and another… …

 you can plot the x̄ values you get in a frequency distribution

 we call the plot of the x̄ values the sampling distribution of x̄

**If the sample size is "large", the sampling distribution of the sample statistic will**

**form a normal distribution**

"large" can be pretty small - usually a sample of size **n = 20** will be sufficient

you can calculate a probability of how close x̄ will be to *μ* using the probabilities

associated with a standard normal distribution and converting the values

into z-scores

x̄ is the best estimate of *μ,* we will use

it to make inferences about

what value *μ* actually has

The standard deviation of x̄ is

s/$\sqrt{n}$

called the “standard error” (se)

About 95% of the possible values for

*μ* will be within 2se of x̄

$\sqrt{n}$This allows us to create a "confidence

interval" for values of *μ*

**Confidence interval** formula:

x̄ – 2s/$\sqrt{n}$ ≤ μ ≤ $\overbar{x}$x̄ + 2s/$\sqrt{n}$

or x̄ – 2se ≤ μ ≤ x̄ + 2se

with a confidence level of 95%

The “2” in the equations is called the

“**critical value**”

It comes from the normal curve,

which gives us the 95%:

2se is called the “**margin of error**”

The percent of time we are willing to be wrong is called “**α**” (“alpha”) or “the α-level”