Sample Mean Sampling Distribution: $\mu_x = \mu_{\bar{x}}$ and $\sigma_{\bar{x}} = \frac{\sigma_x}{\sqrt{n}}$

Sample Mean Sampling Dist z-score: $z = \frac{\bar{x}-\mu_{\bar{x}}}{\sigma_{\bar{x}}} = \frac{\bar{x}-\mu_x}{\frac{\sigma_x}{\sqrt{n}}}$

Popular Z values:

Confidence	Error Probability	Z
.9	.1	1.65
.95	.05	1.96
.99	.01	2.58

Population Mean Confidence Interval known σ_x: $\mu_{\bar{x}} \pm z\left(\frac{\sigma_x}{\sqrt{n}}\right)$

Population Mean Confidence Interval unknown σ_x: $\mu_{\bar{x}} \pm t_{\frac{\alpha}{2},n-1}\left(\frac{\sigma_x}{\sqrt{n}}\right)$

Test Statistic for Mean Hypothesis Test with unknown σ_x: $t^* = \frac{\bar{x}-\mu_x}{\frac{s_x}{\sqrt{n}}}$

Test Statistic for Mean Hypothesis Test with known σ_x: $z^* = \frac{\bar{x}-\mu_x}{\frac{\sigma_x}{\sqrt{n}}}$

Hypothesis Test Decisions:

Alternative Hypothesis	Probability	P-Value
$\boldsymbol{H_a: p > p_0}$	Right Tail	P(Z>z*)
$\boldsymbol{H_a: p < p_0}$	Left Tail	P(Z<z*)
$\boldsymbol{H_a: p \neq p_0}$	Two Tail	2*P(Z<-|z*|)

1) Suppose a simple random sample of 25 bottles of beer from a population with $\sigma_x = .15$ resulted in a sample mean pour of 15.8 oz.

   a. Calculate a 90 confidence interval for the population mean pour.

   b. Test, with 95% confidence that the true population mean pour is 16 oz. Interpret your results. (Just fill out the three steps below.)

      i. State Hypothesis:

      ii. Check Assumptions:

      iii. Calculate Test Statistic

      iv. Find p-value

      v. Interpret

2) A sample of thirty students' spending in Five Points this semester, var 1, provided the data below at the 95% confidence level. Complete parts a and b.

Variable	Sample Mean	Std. Err.	DF	T-Stat	P-value
var1	209.5	3.9562986	29	2.4012343	0.9885

a. Find a 95% confidence interval for the true population mean of the students' spending in Five Points this semester. **Use $t_{\frac{\alpha}{2},n-1}$=2.045.**

b. Test, with 95% confidence that the true population mean of the students' spending in Five Points this semester is less than $200, with the data above. Interpret your results. (Just fill out the three steps below.)

Hypothesis:

P-value:

Decision:

3) Suppose that among a random sample of 26 classes at University of South Carolina, the sample mean class size is 117.15 students with a sample standard deviation of 93.33.

Variable	Sample Mean	Std. Err.	DF	T-Stat	P-value
Class Size	117.15385	18.303652	25	-1.7945137	0.0424

a. Calculate a 95% confidence interval for the population mean of class size. $t_{\frac{\alpha}{2},n-1}$**=2.06.**

b. Test, with 95% confidence that the true population mean class size at University of South Carolina is less than 150, with the data above. Interpret your results. (Just fill out the three steps below.)

Hypothesis:

P-value:

Decision:

4) Suppose that among a random sample of 26 classes at University of South Carolina, the sample mean class size is 117.15 students with a population standard deviation of 95.

   a. Calculate a 95% confidence interval for the population mean of class size.

   b. Test, with 95% confidence that the true population mean class size at University of South Carolina is less than 150, with the data above. Interpret your results. (Just fill out the three steps below.)

      i. State Hypothesis:

      ii. Check Assumptions:

      iii. Calculate Test Statistic

      iv. Find p-value

      v. Interpret

5) The average weekly loss of study hours due to consuming too much alcohol on the weekend is studied on 10 students and the number of hours saved by attending a certain alcohol awareness program. The average number of hours saved was 2.1.

Variable	Sample Mean	Std. Err.	DF	T-Stat	P-value
hours saved	2.1	0.56666667	9	-1.5882353	0.9267

a. Calculate a 90% confidence interval for the population mean number of hours saved. $t_{\frac{\alpha}{2},n-1}$**=1.833.**

b. Test, with 95% confidence that the true population mean number of hours saved is more than 3, with the data above. Interpret your results. (Just fill out the three steps below.)

Hypothesis:

P-value:

Decision: