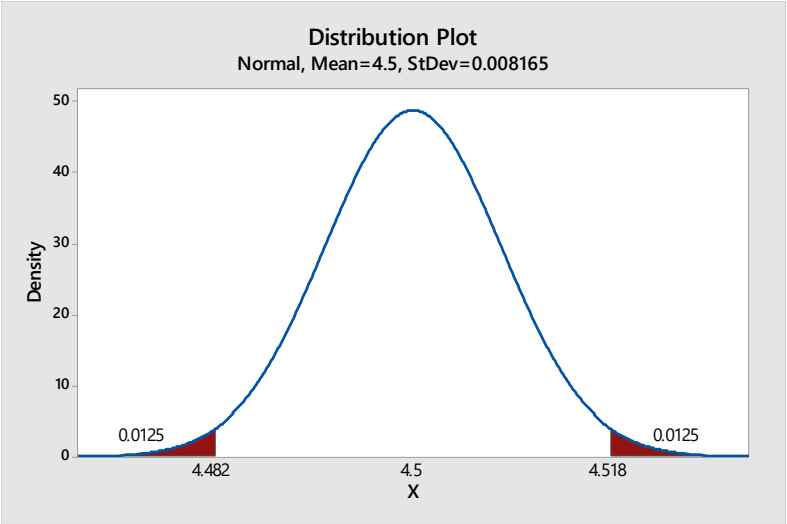
Sampling Distributions & Confidence Intervals

1. A process manager selects a sample of 150 transactions from a lot. He estimates from the sample, average process time is of 4.5 mins with SD of 0.1 mins (which is assumed to be close to population SD). What is the CI for true mean at 95%?

Ans: Pop SD is given and we need to find sample SD

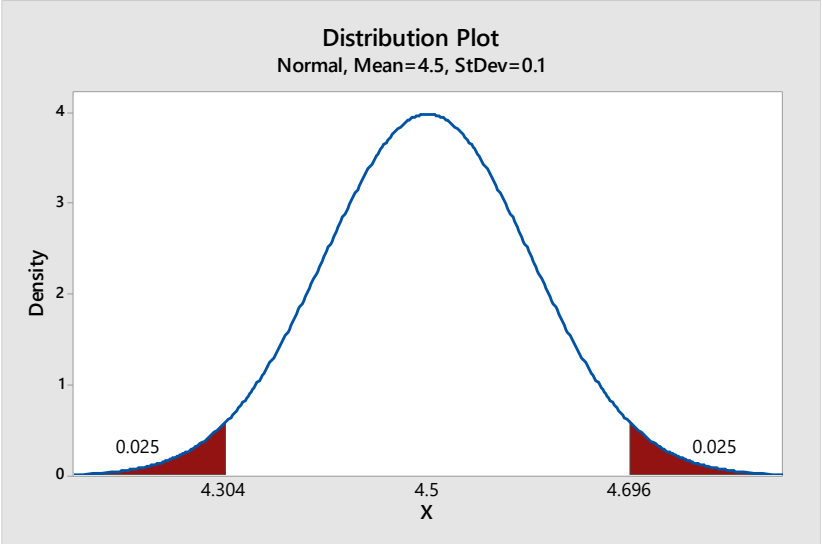
Sample SD = Pop SD/Sqrt(N)

0.008165 = 0.1/Sqrt(150)



2. Let us assume instead of 150, we had on 15 samples and that we don't any idea of population SD. What is the CI for true mean at 95%.

Ans: Sample SD is given as sample size is only 15.

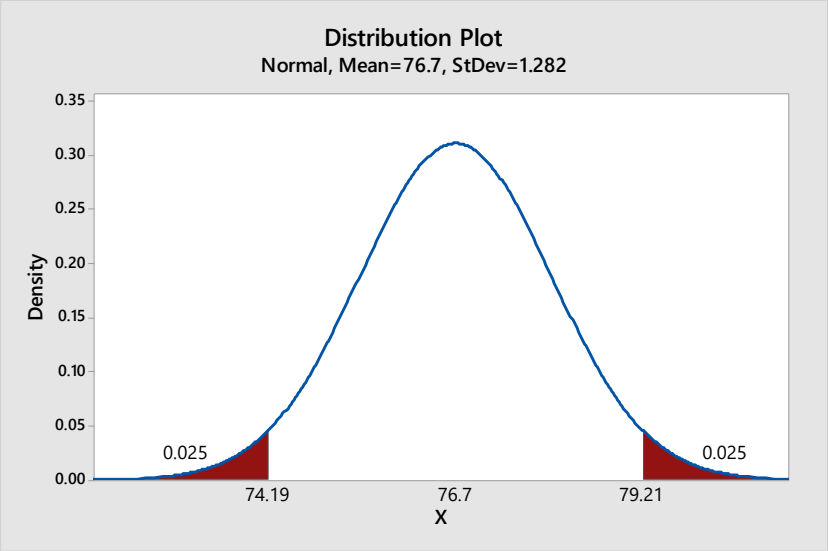


3. Company has established norms for the competency of Executives in an aptitude test. The historic population data suggests that average 73.2 with a standard deviation of 8.6. If 45 randomly selected persons and have an average 76.7, find the confidence interval of the scores at 95% level of confidence.

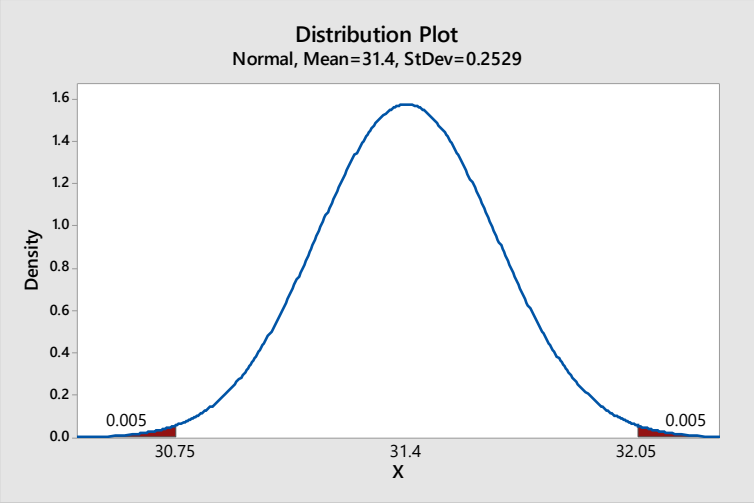
   Ans: Pop SD and Sample size is given.

   Sample SD = Pop SD/Sqrt(N)

   1.282 = 8.6/Sqrt(45)



4. Tests performed with a random sample of 40 diesel engines produced by a large manufacturer show that they have a mean thermal efficiency of 31.4% with a standard deviation of 1.6% . Determine 99% CI for thermal efficiency.



5. Calculate a 95% confidence interval for the standard deviation for the n = 100 ; S = 8.1

Test and CI for One Variance

Method

σ: standard deviation of Sample
The Bonett method cannot be calculated for summarized data.
The chi-square method is valid only for the normal distribution.

Descriptive Statistics

N	StDev	Variance	95% CI for σ using Chi-Square
100	8.10	65.6	(7.11, 9.41)

6. If 12 determinations of loan approval rate have a standard deviation 0.0086, estimate 90% CI for sd of loan approval rate.

Test and CI for One Variance

Method

σ: standard deviation of Sample
The Bonett method cannot be calculated for summarized data.
The chi-square method is valid only for the normal distribution.

Descriptive Statistics

N	StDev	Variance	90% CI for σ using Chi-Square
12	0.00860	0.000074	(0.00643, 0.01334)

7. An internal auditor randomly selects 200 documents for an audit. He finds 5 defective documents. Calculate a 90% confidence interval for the proportion of good documents.

Test and CI for One Proportion

Method

p: event proportion
Exact method is used for this analysis.

Descriptive Statistics

N	Event	Sample p	90% CI for p
200	5	0.025000	(0.009901, 0.051843)

Test

Null hypothesis	H_0: p = 0.5
Alternative hypothesis	H_1: p ≠ 0.5