

Exercise 5. Parameter estimation

1. Generate 100 samples of size 100 from a Poisson distribution with mean 4. Store the 100 sample means in a separate column (Stat > Basic Statistics > Store Descriptive Statistics; Manip > Stack > Stack Rows). What distribution does the Central Limit Theorem say will approximate the distribution of these means? Assess this claim with a suitable plot.
2. Suppose that the daily mean temperature at the Plato Cave weather station is precisely a sequence of independent Normal random variables with expectation 10°C and standard deviation 5°C . Generate a sequence of 100 daily mean temperatures. Now pretend that you do not know the true mean of the Normal distribution, and calculate a point estimate for it. By hand, also compute 90%, 95% and 99% confidence intervals. Do any of your intervals contain the true mean? What is the correct interpretation of the intervals?

Point estimate =

90% confidence interval =

95% confidence interval =

99% confidence interval =

3. Simulate 99 more samples of 100 temperatures and store the 100 sample means in a separate column. Calculate the standard deviation of your sample means and compare it to the standard error that you would expect theoretically. Compute a 90% confidence interval from each sample, storing the lower and upper limits in separate columns. What proportion of the intervals contain the true value, 10°C? What proportion would you expect?

Sample standard deviation =

Theoretical standard error =

Proportion of intervals =

Expected proportion =

