

Worksheet 19

1. Assume that $X_1, \dots, X_5 \sim_{i.i.d.} N(\mu, 3^2)$ and you observe the values: 1, 3, 4, 6, 10. Find a confidence interval at the 95% confidence level for μ . Hint: You can let s be the real standard deviation here.

2. Assume that $X_1, \dots, X_5 \sim_{i.i.d.} N(\mu, \sigma^2)$ and you observe the values: 1, 3, 4, 6, 10. Find a confidence interval at the 95% confidence level for μ . How does it compare to the one from question 1?

3. Assume that $X_1, \dots, X_5 \sim_{i.i.d.} N(\mu, \sigma^2)$ and you observe the values: 1, 3, 4, 6, 10. Find a confidence interval at the 80% confidence level for μ . How does it compare to the one from question 2?

4. Sometimes we want a one-sided confidence interval of the form:

$$\mathbb{P}[b < \mu] = \alpha$$

Using the same data as from question 1 (with the known variance), find the value of b to get a one-sided confidence interval at the 95% confidence level.

5. Consider estimating the probability that a coin comes up heads when tossed. How many tosses are needed to guarantee that a 95% confidence interval will be smaller than 0.1? Hint: We know that the variance is maximized when p is equal to 0.5.