

Homework 5

Write a .Rmd file to answer these questions. Start by pasting this outline to help the grader find your answers:

(Your Name Here)

1 Confidence interval for dissolved oxygen

1a

1b

1c

1d

Knit your .Rmd file to .html along the way. Turn in your .html file to Canvas.

1. A simple random sample was taken of 44 water bottles from a bottling plant's warehouse. The dissolved oxygen content (in mg/L) was measured for each bottle, with these results:

11.53, 8.35, 11.66, 11.54, 9.83, 5.92, 7.14, 8.41, 8.99, 13.81, 10.53, 7.4, 6.7, 8.42, 8.4, 8.18, 9.5, 7.22, 9.87, 6.52, 8.55, 9.75, 9.27, 10.61, 8.89, 10.01, 11.17, 7.62, 6.43, 9.09, 8.53, 7.91, 8.13, 7.7, 10.45, 11.3, 10.98, 8.14, 11.48, 8.44, 12.52, 10.12, 8.09, 7.34

Here the sample mean is 9.14 mg/L.

The population standard deviation of the dissolved oxygen content for the warehouse is known from long experience to be about $\sigma = 2$ mg/L.

- (a) Find a 98% confidence interval for the unknown population mean dissolved oxygen content.
- (b) Interpret your interval—in particular, what does the “98% confidence” mean?
- (c) What sample size n is required to get a 98% confidence interval with error margin 0.5?
- (d) To make a Z confidence interval, we must assume that the sample mean is (approximately) normally distributed, which it will be if the population is normal or the sample size is large enough—that is, if $n > 30$ by our rule-of-thumb.
Here we have $n = 44$, so we do not need to check for a normal population. However, as practice for when n is smaller, make a normal QQ-plot of the sample. Is it plausible that the sample came from a normal population?