

1. Problem

It is suspected that a supplier systematically underfills 5 l canisters of detergent. The filled volumes are assumed to be normally distributed. A small sample of 14 canisters is measured exactly. This shows that the canisters contain on average 4957.4 ml. The sample variance s_{n-1}^2 is equal to 1176.3.

Determine a 95% confidence interval for the average content of a canister (in ml).

- (a) What is the lower confidence bound?
- (b) What is the upper confidence bound?

Solution

The 95% confidence interval for the average content μ in ml is given by:

$$\begin{aligned} & \left[\bar{y} - t_{n-1;0.975} \sqrt{\frac{s_{n-1}^2}{n}}, \bar{y} + t_{n-1;0.975} \sqrt{\frac{s_{n-1}^2}{n}} \right] \\ &= \left[4957.4 - 2.1604 \sqrt{\frac{1176.3}{14}}, 4957.4 + 2.1604 \sqrt{\frac{1176.3}{14}} \right] \\ &= [4937.597, 4977.203]. \end{aligned}$$

- (a) The lower confidence bound is 4937.597.
- (b) The upper confidence bound is 4977.203.