



Equitable Equations: *Confidence intervals and sample size*

Problem 1

A fast-food restaurant needs to estimate the mean carbohydrate count in a new sandwich to within 15 grams. How large a sample is needed if the population standard deviation is $\sigma = 25g$? Use 95% confidence.

Problem 2

How many sandwiches would the restaurant need to test to estimate the mean carbohydrate count to within 5g?

Problem 3

Suppose the restaurant realizes that they've underestimated σ , the amount of variability in the carbs of their sandwiches. Would the sample sizes in problems 1 and 2 be increased or decreased?

$$1) \begin{aligned} c &= 95 \\ z_* &= 1.960 \end{aligned}$$

$$z_* \frac{\sigma}{\sqrt{n}} = 15 = 1.960 \frac{25}{\sqrt{n}}$$

$$\left(\frac{1.960(25)}{15} \right)^2 = n = 10.67 = 11 \text{ sandwiches}$$

$$2) z_* \frac{\sigma}{\sqrt{n}} = 5 = 1.960 \frac{25}{\sqrt{n}}$$

$$\left(\frac{1.960(25)}{5} \right)^2 = n = 96.04 = 95 \text{ sandwiches}$$

3) The sample size will increase as σ increases