

Normal Distribution Practice 2

- Three companies sell vitamin B12 supplements locally. All three products are labelled as containing 100µg (micrograms). **You analyze 60 tablets** from each product and determine the following:

Product A

$$\bar{x} = 102.1\mu\text{g}$$

$$s = 1.7\mu\text{g}$$

Product B

$$\bar{x} = 100.1\mu\text{g}$$

$$s = 2.4\mu\text{g}$$

Product C

$$\bar{x} = 103.0\mu\text{g}$$

$$s = 0.7\mu\text{g}$$

You want to ensure that **90% of tablets** have between **98µg and 104µg** of vitamin B12. Which products are in the **acceptable range**?

- For a normal distribution with $\bar{x} = 0.243$ and $s = 0.0073$, find $P(0.240 < X < 0.250)$.
- A normal distribution has a standard deviation of 3 and a mean of 1. What is the z-score for the value $x = -1$?
- Two confidence intervals are created from the same data. One has a significance level of 10% and the other has a significance level of 5%. Which interval is larger? Give justification.
- A normal distribution has a mean of $\mu = 56.3$ and a standard deviation of $\sigma = 12.3$. What value is at the third quartile?
- A government agency is considering changing the nutritional information labels found on food products. Instead of printing a single value for each nutrient, they propose printing a **95% confidence interval** based on the testing of **10 samples** of each product.
 - For a 50g serving of multigrain tortilla chips, the current label shows 13g of total fat. Analysis of 10 samples shows a mean of 12.75g and a standard deviation of 1.22g of fat. Construct the 95% confidence interval for total fat.
 - For a 50g serving of multigrain tortilla chips the dietary fibre measured across 10 samples was 1.53g with a standard deviation of 2.75g. Construct the 95% confidence interval for dietary fibre and explain why the interval is not valid.
 - Propose some reasons that this labelling change may not be beneficial for the consumer. Give at least two reasons and include an explanation for each.

Nutrition Facts	
Serving size	34 chips (50g)
Amount Per Serving	
Calories	260
<small>% Daily Value*</small>	
Total Fat 13g	17%
Saturated Fat 1.5g	8%
<i>Trans</i> Fat 0g	
Cholesterol 0mg	0%
Sodium 200mg	9%
Total Carbohydrate 33g	12%
Dietary Fiber 3g	11%
Total Sugars 1g	
Includes 1g Added Sugars	2%
Protein 3g	6%
<small>Not a significant source of vitamin D, calcium, iron, and potassium</small>	
<small>*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.</small>	