

Part I – Coffee Data

The following analysis is based on a small sample data set of 15 randomly selected coffee shops representing the price of a 100 gram pack of instant coffee.

Stem and leaf plots create useful visual aids for analyzing the shape of the distribution. In this case, we have concluded the sample data set reflects a symmetric distribution, due to the mound shape of the stem and leaf plot.

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9 | 3
9 | 56789
10 | 0112244
10 | 79

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Figure 1: Stem and Leaf Plot of Coffee Shop Data

The 95% confidence interval of the instant coffee sample is 98.09358 to 102.97309 with a true mean of 100.53 and standard distribution of 4.41. This represents that 95% of the time, the mean should fall in between the two data points. To come to this conclusion, the correct method must be used. The assumptions involved with the one-sample t procedure state that it will work

Data Summary	
Minimum	93.0
1 st Quartile	97.5
Median	101.1
Mean	100.5
3 rd Quartile	103.0
Maximum	109.0
SD.	4.406

Figure 2: Summary of Coffee Data

T-Test of Coffee Prices
t = 88.379
df = 14
p-value < 2.2e-16
Alternative Hypothesis: true mean is not equal to 0
95% percent confidence interval: 98.09358, 102.97309
Sample estimates: mean of x = 100.5333

Figure 3: RStudio Output of Coffee Price Data T-Test

reasonably well if n is greater than or equal to 15, unless there are outliers or strong skewness. Since this data satisfies the $n=15$ assumption and does not contain any evident outliers or skewness, this test provides valid data.

To calculate how many shops would have to be sampled, the standard deviation of the population must first be converted from pence to Canadian currency. With the converted standard deviation of 0.074, the margin of error formula can now be used: $z_{\alpha/2} \frac{\sigma}{\sqrt{n}} \leq m$

Setting the formula equal to 0.05, the z score equal to 1.96 (95% confident level) and the standard deviation equal to 0.074, solving for “n” will give you the value 8.43. Since “n” represents the number of randomly selected shops, this indicates you would have to sample 9 shops to estimate the mean price with a \$0.05 margin of error.