

SOLUTIONS

Question 1 (5 marks) Various data was collected from 30 maple trees in a maple syrup farm. Classify the following variables by filling out the table.

Variable	Qualitative/Quantitative	Nominal/Ordinal/Interval/Ratio
Amount of sap excreted (ml/day)	QUANTITATIVE	RATIO
Quality of syrup produced A (best), B, C, D (worst)	QUALITATIVE	ORDINAL
Type of maple (silver, red)	QUALITATIVE	NOMINAL
Temperature of soil at base of tree (in °C)	QUANTITATIVE	INTERVAL
Height of tree (cm)	QUANTITATIVE	RATIO

Question 2 (15 marks) Here are the 30 measurements of height that were observed (in cm):

150 164 172 173 181 180 180 190 193 193 231 155 167 168 171
170 174 182 184 194 161 166 171 175 176 162 193 185 188 172

- Sort the data using a stem & leaf display
- Find the sample mean \bar{x}
- Find P_{60}
- Find the total variation, $SS(X)$
- Find the sample standard deviation, s
- Calculate the z-score of the smallest and largest data values.
- Are there any outliers in the sample of 30 trees? Justify your answer.
- What % of the data falls within one standard deviation from the mean? Is this consistent with the Empirical Rule?

SOLUTIONS
QUIZ - VERSION 2

②

a

Stem	Leaf
15	0 5
16	4 7 8 1 6 2
17	2 3 1 0 4 1 5 6 2
18	1 0 0 2 4 5 8
19	0 3 3 4 3
⋮	
23	1

150 155 161 162 164 166 167 168 170 171
 171 172 172 173 174 175 176 180 180 181
 182 184 185 188 190 193 193 193 194 231

(b) $\bar{x} = \frac{\sum_{i=1}^{30} x_i}{30} = \frac{5321}{30} = \boxed{177.37}$

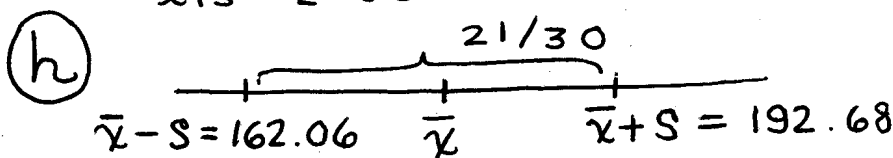
(c) $P_{60}: (0.6)(30) = 18$ Depth = 18.5
 So P_{60} between 18th & 19th item
 $P_{60} = \frac{180 + 180}{2} = \boxed{180}$

(d) $SS(X) = \sum x_i^2 - \frac{(\sum x_i)^2}{30} = 950565 - \frac{(5321)^2}{30} = \boxed{6796.97}$

(e) $s = \sqrt{\frac{SS(X)}{n-1}} = \boxed{15.31}$

(f) SMALL: $z = \frac{150 - 177.37}{15.31} = \boxed{-1.79}$ Large: $\frac{231 - 177.37}{15.31} = \boxed{3.5}$

(g) Yes $x = 231$ is an outlier because its z score is ABOVE 3.



$21/30 = 70\%$ FALLS within 1 s.d. Yes it FOLLOWS e. rule ($\approx 68\%$)