QUIZ 1 – Version 1
201-BZS-05
Probability & Statistics

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SOLUTIONS

Question 1 (5 marks) Various data was collected from 30 undergraduate students in a 1st year Psychology class. Classify the following variables by filling out the table.

Variable	Qualitative/Quantitative	Nominal/Ordinal/Interval/Ratio
Sex (Male or Female)	QUALITATIVE	NOMINAL
Savings Account Bank Balance ($) Note: Negative # indicates debt	QUANTITATIVE	INTERVAL (RATIO accepted)
Body Temperature (in °F)	QUANTITATIVE	INTERVAL
Midterm Letter Grade (A to F)	QUALITATIVE	ORDINAL
Height (cm)	QUANTITATIVE	RATIO

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

140 154 162 163 171 170 170 180 183 183 191 145 157 158 161
160 164 172 174 184 151 156 161 165 166 152 183 175 178 162

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

SOLUTIONS
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② (a)

STEM	LEAF
14	0 5
15	4 7 8 1 6 2
16	2 3 1 0 4 1 5 6 2
17	1 0 0 2 4 5 8
18	0 3 3 4 3
19	1

140 145 151 152 154 156 157 158 160 161
161 162 162 163 164 165 166 170 170 171
172 174 175 178 180 183 183 183 184 191

(b) $\bar{x} = \sum_{i=1}^{30} x_i = \frac{4991}{30} = \boxed{166.37}$

(c) P_{30} : $(0.3)(30) = 9 \rightarrow$ 9.5 is the depth between 9th & 10th DATA point

$P_{30} = \frac{160+161}{2} = \boxed{160.5}$

(d) $SS(X) = \sum_{i=1}^{30} x_i^2 - \frac{\left(\sum x_i\right)^2}{30} = 834785 - \frac{(4991)^2}{30}$

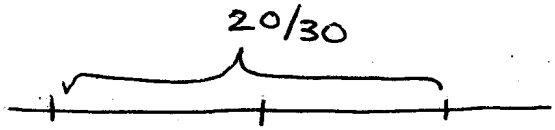
$= \boxed{4448.97}$

(e) $s = \sqrt{\frac{SS(X)}{n-1}} = \boxed{12.39}$

(f) $z_{140} = \frac{140-166.37}{12.39} = \boxed{-2.13}$ $z_{191} = \frac{191-166.37}{12.39} = \boxed{1.99}$

(g) Outliers must be outside $-3 \le z \le 3$ so there are none in this case

(h)



$\bar{x}-s = 153.98$ $\bar{x}$ $\bar{x}+s = 178.75$

66.67% of data is within 1 standard deviation of the mean. This is consistent with 68% of Empirical rule.