MATH1060 Statistics for Data Analysis

Quiz 1

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1. There are a total of 2 questions.
2. You have 60 minutes.
3. You have extra 20 minutes to upload your solutions as a single PDF file to the folder Quiz 1.
4. You may refer to the materials provided in class, i.e., lecture notes, sample tests, etc.
5. DO NOT USE INTERNET other than accessing our course page on the Learning Hub.
6. Work must be shown for full marks. In particular, you must write down formulas used.
7. Unless otherwise specified or implied, round answers to 3 significant figures), e.g., $0.01234567 \to 0.012$.

Question 1: [3 Marks] On a certain test, marked out of 80, you are informed that the class mean is 67.5, the class variance is 12.5 and your z-score is 0.65

a) What was your actual mark?

mean = 67.5

Variance = 12.5 = sd

$z = 0.65$

$$z = \frac{x - \text{mean}}{sd}$$

$$0.65 = \frac{x - 67.5}{12.5}$$

$$(0.65)(12.5) = x - 67.5$$

$$8.125 = x - 67.5$$

$$75.625 = x$$

b) If your friend's actual mark is 61, what is her z-score?

$$z = \frac{61 - 67.5}{12.5} = -0.520$$

$$z = \frac{x - \text{mean}}{sd}$$

Question 2: [7 Marks] Use the available data set `mtcars` (Motor Trend Car Road Tests) in R

a) Find quartiles Q_1 and Q_3 of the data for `hp` (Gross horsepower).

View(mtcars$hp)

x = mtcars$hp

x = sort(x)

length(x)

q_1 = median(x[1:16]) → Q_1 = 96

q_3 = median(x[17:32]) → Q_3 = 180

b) Does the data set have outliers? Prove it and find them by computing whiskers.

$IQR = Q_3 - Q_1$ whiskers $x < Q_1 - 1.5(IQR)$ $x > Q_3 + 1.5(IQR)$

i = q3 - q1

wl = q1 - (1.5 * i) → -30

wr = q3 + (1.5 * i) → 306

boxplot(x, horizontal = TRUE)

Yes, there is one outlier that has the value 335

c) Find the z-score of Lincoln Continental in `hp`.

x = 215

mean = mean(mtcars$hp) =

sd = sd(mtcars$hp) =

$z = \frac{x - mean}{sd}$

z = (215 - mean(mtcars$hp)) / sd(mtcars$hp)

= 0.9963483

= 0.996