Assignment 1

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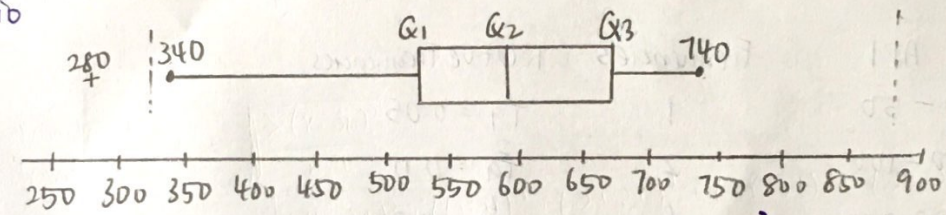
(1) a). ratio
b). ordinal
c). interval
d). nominal
e) ordinal
f). ratio
g). ratio
h). interval
i) ratio
j) ratio

(2) ai) population : the freshmen class at Lincoln High School
ii) sample : 100 students randomly selected.

bi) nominal
ii) ratio
iii) ratio

ci)



ii) $Q_1 = \frac{1}{4}(20)$ $Q_2 = \frac{1}{2}(20)$ $Q_3 = \frac{3}{4}(20)$

$= 5$ $= 10$ $= 15$

$Q_1 = \frac{Y[5] + Y[6]}{2}$ $Q_2 = \frac{Y[10] + Y[11]}{2}$ $Q_3 = \frac{Y[15] + Y[16]}{2}$

$= \frac{520 + 540}{2}$ $= \frac{580 + 600}{2}$ $= \frac{660 + 680}{2}$

$= 530$ $= 590$ $= 670$

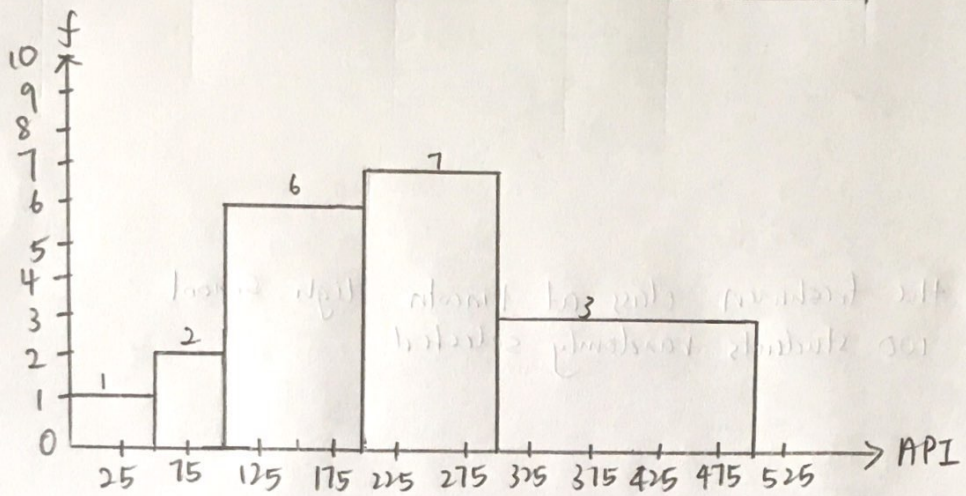
Interquartile range (IQR) $= Q_3 - Q_1$
$= 670 - 530$
$= 140$

Min: $Q_1 - 1.5(IQR)$
$= 530 - 1.5(140)$
$= 320$

Max: $Q_3 + 1.5(IQR)$
$= 670 + 1.5(140)$
$= 880$

3a).

API	lower boundaries	upper boundaies	f	Midpoint
0-50	0	50	1	25
50-100	50	100	2	75
100-200	100	200	6	150
200-300	200	300	7	250
300-500	300	500	3	400



b).

API	Frequencies	relative Frequencies
0 - 50	1	$\frac{1}{19} = 0.05$
50 - 100	2	$\frac{2}{19} = 0.11$
100 - 200	6	$\frac{6}{19} = 0.32$
200 - 300	7	$\frac{7}{19} = 0.37$
300 - 500	3	$\frac{3}{19} = 0.16$
Total	19	1.00

Percentage with API ≥ 100

$= (0.32 + 0.37 + 0.16) \times 100\%$

$= 85\%$

c). Yes. Because mean can be affected by outliers.
Besides, all the values are taken into account.

(4)(a) $\text{mean} = \dfrac{92+98+112+88+134+36+35+92+215+336+237}{11}$

$= \dfrac{1475}{11}$

$= 134.09$

mode = 92

35, 36, 88, 92, 92, 98, 112, 134, 215, 237, 336

$\frac{11}{2} = 5.5$

median = X[6]

= 98

standard deviation, $s = \sqrt{\dfrac{\Sigma(x-\bar{x})^2}{n-1}}$

$= \sqrt{\dfrac{(92-134.09)^2+(98-134.09)^2+(112-134.09)^2+(88-134.09)^2+(134-134.09)^2+(36-134.09)^2+(35-134.09)^2+(92-134.09)^2+(215-134.09)^2+(336-134.09)^2+(237-134.09)^2}{11-1}}$

$= \sqrt{\dfrac{84802.9091}{10}}$

$= 92.09$

(b) Percentile of the deaths 215 $= \frac{8}{11} \times 100\%$

$= 72.73\%$

(c) Mean. Because it can be affected by outliers and all the values are taken to be account

(5)(a) $\text{mean} = \dfrac{14+14+10+12+11+13+11+11+14+10+13+8}{12}$

$= \dfrac{141}{12}$

$= 11.75$

mode = 11 and 14

8, 10, 10, 11, 11, 11, 12, 13, 13, 14, 14, 14

$\frac{12}{2} = 6$

$\text{median} = \dfrac{X[6]+X[7]}{2}$

$= \dfrac{11+12}{2}$

$= 11.5$

range = 14 - 8
= 6

(b) median < mean
∴ It is positively skew (positive distribution)

(c) standard deviation, $s = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$

$$= \sqrt{\frac{(14-11.75)^2+(14-11.75)^2+(10-11.75)^2+(13-11.75)^2+(11-11.75)^2+(13-11.75)^2+(11-11.75)^2+(14-11.75)^2+(10-11.75)^2+(13-11.75)^2+(8-11.75)^2}{12-1}}$$

= 1.9129

(d) $12 \times \frac{1}{4} = 3$

$Q_1 = \frac{X[3]+X[4]}{2}$

$= \frac{10+11}{2}$

$= 10.5$

$12 \times \frac{3}{4} = 9$

$Q_3 = \frac{X[9]+X[10]}{2}$

$= \frac{13+14}{2}$

$= 13.5$

Lower limit $= Q_1 - 1.5IQR$

$= 10.5 - 1.5(13.5 - 10.5)$

$= 6 < 7$

∴ The data is not considered an outlier

(6) (a) mean $= \frac{14+12+21+28+30}{5}$

$= 21$

standard deviation, $s = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$

$$= \sqrt{\frac{(14-21)^2+(12-21)^2+(21-21)^2+(28-21)^2+(30-21)^2}{5-1}}$$

= 8.0623

skewness $= \frac{\Sigma(x-\bar{x})^3}{(n-1)s^3}$

$$= \frac{(14-21)^3+(12-21)^3+(21-21)^3+(28-21)^3+(30-21)^3}{(5-1)(8.0623)^3}$$

= 0

(b) It is neither positively skewed nor negatively skewed. The skewness value is zero. Hence it is symmetrical distribution