Cambridge International AS & A Level

Mathematics 9709/52

Paper 5 Probability & Statistics 1 **May/June 2024**

Question No (4)

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The back-to-back stem-and-leaf diagram shows the annual salaries of 19 employees at each of two companies, Petral and Ravon.

Petral							Ravon				
			3	0	0	30	2	6			
9	9	8	2	2	1	31	1	5			
		5	5	4	0	32	0	0	2		
			7	5	3	33	0	4	8	9	
				1	0	34	1	1	3	4	6
						35	3				
					8	36	7	9			

Key: 2 | 31 | 5 means $31 200 for a Petral employee and $31 500 for a Ravon employee.

(a) Find the median and the interquartile range of the salaries of the Petral employees.

The median salary of the Ravon employees is $33 800, the lower quartile is $32 000 and the upper quartile is $34 400.

(b) Represent the data shown in the back-to-back stem-and-leaf diagram by a pair of box-and-whisker plots in a single diagram.

(c) Comment on whether the mean or the median would be a better representation of the data for the employees at Petral.

Solution:

(a)

Petrol		Ravon
(3) 3 0 0	30	2 6
(6) 9 9 8 2 2 1	31	1 5
(4) 5 5 4 0	32	0 0 2
(3) 7 5 3	33	0 4 8 9
(2) 1 0	34	1 1 3 4 6
	35	3
(1) 8	36	7 9

No of data in petrol, $n = 19$

formula for median

$$Q_2 = \text{median} = \left(\frac{n+1}{2}\right)\text{th term}$$

$$= \left(\frac{19+1}{2}\right)\text{th term}$$

$$= 10\text{th term}$$

$Q_2 = 32000$

∴ key: 2|3|1|5 mean $31200 for petrol employee and $31500 for Ravon employee.

In order to calculate the interquartile range (IQR), we need to calculate the middle value of upper half of the median (Q_2).

so lower quartile is, LQ = 5th term

= 31200

and the upper quartile is mid value of upper half of the median.

UQ = 15th term

= 33500

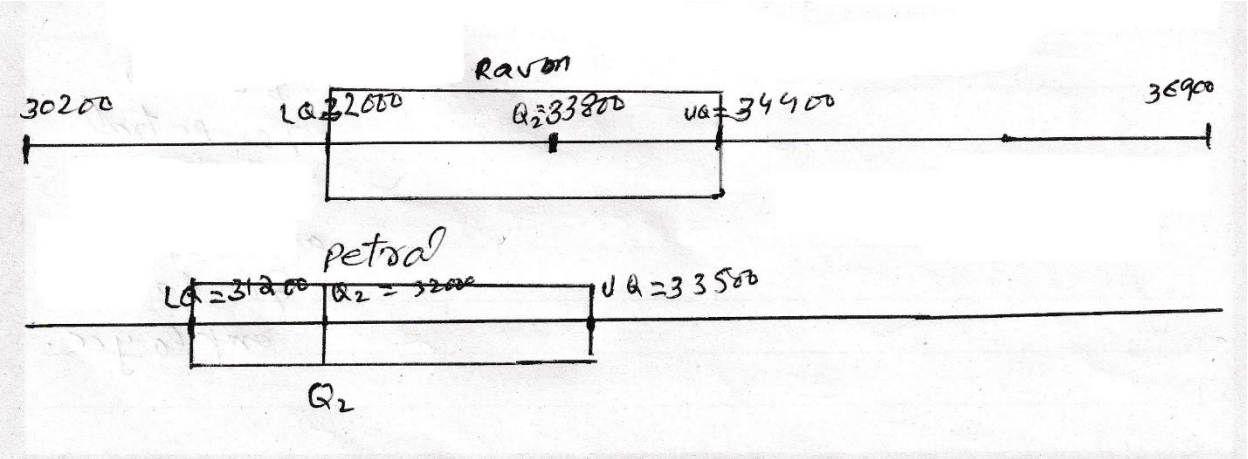
so

interquartile range, IQR = UQ − LQ

= 33500 − 31200

= 2300

(b)



(c)

Median as there is extreme value $36800. in case of petrol employee.