Final Paper Of Statistics

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Q#1

① //

Class boundries	f	x	fx
360 — 375	4	36,5	1460
375 — 390	6	382.5	2295
390 — 405	8	397.5	3180
405 — 420	7	412.5	2887.5
420 — 435	4	427.5	1710

$\sum fx = 11,5325$

$$\text{Mean} = \frac{\sum xf}{\sum f}$$

$$\text{Mean} = \frac{11532.5}{29}$$

$$\text{Mean} = 397.67$$

$\text{Mean} = 397.67 \cong \overset{9}{3}8. = 398/-$

$$\text{Mode} = Z = L_1 + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times i$$

②

To modal class is 390-405 having frequency = 8.

Thus $L_1 = 390$

$i = 15$

$f_1 = 8$

$f_2 = 7$

$f_0 = 6$

$$\Rightarrow Z = 390 + \frac{8-6}{2(8)-6-7} \times 15$$

$$Z = 390 + \frac{2}{16-6-7} \times 15$$

$$Z = 390 + (0.666) \times 15$$

$$Z = 390 + 10$$

$$Z = 4000 \longrightarrow \text{Mode}$$

Median:-

$$\text{Median} = L_1 + \left[\left(\frac{N}{2} - f\right)/f\right]c$$

Median class = 390-405

Thus

$L = 390$

$\frac{N}{2} = \frac{29}{2} = 14.5$

$F = 10$

$f = 8$

$c = 9$

$$\text{Median} = 390 + \left[\left(14.5 - 10\right)\right] \times 9$$

$$\text{Median} = 390 + (0.5625) \times 9$$

$$= 390 + 5.0625$$

$$= 395.0625$$

Median = 395

L = lower class boundry

F = cummulative frequency

f = median class

c = size of class

n = total frequency values

③ QUARTILES:-

$$Q_1 = L_{Q_1} + \left[\frac{N/4 - Cf}{f_{Q_1}}\right] \times i$$

$$Q_1 = 375 + \left[\frac{29/4 - 4}{6}\right] \times 9$$

$$Q_1 = 375 + \left[\frac{3.25}{6}\right] \times 9$$

$$Q_1 = 375 + (0.541) \times 9$$

$$Q_1 = 375 + 4.875$$

$$Q_1 = 379.875$$

25023? - 15184

Q#2

① //

Set 1 = 3, 6, 2, 1, 7, 5

Set 2 = 11, 17, 9, 7, 19, 15

S.D of Mean

$$S \cdot D = \sqrt{\frac{\sum (n-\bar{n})^2}{n-1}}$$

Set 1:-

$$S \cdot D = \sqrt{\frac{\sum (n-\bar{n})^2}{n-1}}$$

n	$n-\bar{n}$	$(n-\bar{n})^2$
3	3-4=1	1
6	6-4=2	4
2	2-4=-2	4
1	1-4=-3	9
7	7-4=3	9
5	5-4=1	1
$\sum n = 24$		$\sum(n-\bar{n})^2 = 28$

$$S \cdot D = \sqrt{\frac{28}{6-1}} = \sqrt{\frac{28}{5}}$$

$$S \cdot D = \sqrt{5 \cdot 6} = S \cdot D = 2.366$$

$$\text{Mean} = \bar{n} = \frac{\sum n}{n} = \frac{24}{6} = 4$$

Set#2:

2

x	$x-\bar{x}$	$(x-\bar{x})^2$
11	$11-13=-2$	4
17	$17-13=4$	16
9	$9-13=-4$	16
7	$7-13=-6$	36
19	$19-13=6$	36
15	$15-13=2$	4

$$\sum(x-\bar{x})^2 = 112$$

$$\text{Mean} = \frac{\sum x}{n} = \frac{78}{6} = 13$$

$$\bar{x} = 13$$

$$S.D = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$$

$$S.D = \sqrt{\frac{112}{6-1}} = \sqrt{\frac{112}{5}} = \sqrt{22.4}$$

$$S.D = 4.732.$$

S.D and Mean of Set "2" is increased from Set 1.

Q. 3

Classes	f_i	x_i	$f_i x_i$	x_i^2	$f_i x_i^2$
65-84	15	74.5	1117.5	5550.25	1248806.25
85-104	18	94.5	1701	8930.25	2893401
105-124	27	114.5	3091.5	13110.25	9557372.52
125-144	10	134.5	1345	18090.25	1809025
145-164	6	154.5	927	23870.25	859329
165-184	5	174.5	872.5	30450.25	761256.25
185-204	13	194.5	2528.5	37830.25	6393312.25

$\Sigma f_i = 94$. $\Sigma f_i x_i = 11583$. $\Sigma f_i x_i^2 = 23522502.27$

$$S^2 = \frac{\Sigma f_i x_i^2}{n} - \left(\frac{\Sigma f_i x_i}{n}\right)^2$$

$$S^2 = \frac{23522502.27}{94} - \left(\frac{11583}{94}\right)^2$$

$$S^2 = 235055.37$$

&

$$S = \sqrt{\frac{\Sigma f_i x_i^2}{n} - \left(\frac{\Sigma f_i x_i}{n}\right)^2}$$

$$S = \sqrt{235055.37} = \boxed{484.82}$$ Ans.

Q4.
-/-

When two fair dice are throw.
The possibilities are as below.

$S = (1,1)(1,2)(1,3)(1,4)(1,5)(1,6)$
$(2,1)(2,2)(2,3)(2,4)(2,5)(2,6)$
$(3,1)(3,2)(3,3)(3,4)(3,5)(3,6)$
$(4,1)(4,2)(4,3)(4,4)(4,5)(4,6)$
$(5,1)(5,2)(5,3)(5,4)(5,5)(5,6)$
$(6,1)(6,2)(6,3)(6,4)(6,5)(6,6)$.

* The possibilities of getting a double 6 is

[redacted]

$A = (6,6)$

$P(A) = \frac{1}{36}$.

* Let B denotes that a sum of 8 or more dots occur.

$B = \{(2,6),(3,5),(3,6),(4,4),(4,5),(4,6),(5,3),$
$(5,4)(5,5)(5,6)(6,2)(6,3)(6,4)(6,5)$
$(6,6)\}$

$P(B) = \frac{15}{36} = \frac{5}{12}$

Q.5/-

An event A and B is independent of C if

$P(A) = P(A)(C)$

and

$P(B) = P(B)(C)$

$\Rightarrow P(A) = P(A)(C)$

$P(A) = P(A \cap C)$

$= P(A_1 \cap \cdots\cdots \cap A_M)$.

$= P(A_1) \times P(A_2) \cdots\cdots \times P(A_m)$

$P(B) = P(B)(C)$

$= P(B \cap C)$

$= P(B_1 \cap \cdots\cdots B_M)$

$= P(B_1) \times P(B_2) \cdots\cdots \times P(B_M)$.

Q5.
//

(a) Ci's from a partition of the sample space, by the law of total probability:

$$P(A \cap B) = \sum_{i=1}^{M} P(A \cap B \mid C_i) P(C_i)$$

$$= \sum_{i=1}^{m} P(A \mid C_i) P(B \mid C_i) P(C_i)$$

Since A and B are condionally independent -

* B is independent of all Ci's
Ci's form a partition of the sample space, by low of probability

$$P(B \cap C_i) = \sum_{i=1}^{m} P(B/C_i)\ P(C_i)$$

$$= \sum_{i=1}^{m} P(B/C)\, P(C_i)$$

∴ B is condionally independent of all Ci's.