

Assignment - 2

Q1	Income	fA	c.f.A	fB	c.f.B
	55-58	12	12	20	20
	58-61	17	29	22	42
	61-64	23	52	25	67
	64-67	18	70	13	80
	67-70	11	81	4	84
		81		84	

$$Q_{1A} = 58 + \frac{20.5 - 12}{17} \times 3 = 59.5$$

$$Q_{3A} = 64 + \frac{61.5 - 52}{18} \times 3 = 65.58$$

$$\text{Median}_A = 61 + \frac{40.5 - 29}{23} \times 3 = 62.5$$

$$S_{kewA} = \frac{65.58 + 59.5 - 2 \times 62.5}{65.58 - 59.5}$$

$$= \frac{0.08}{6.08} = 0.013$$

$$Q_{1B} = 58 + \frac{21 - 20}{22} \times 3 = 58.14$$

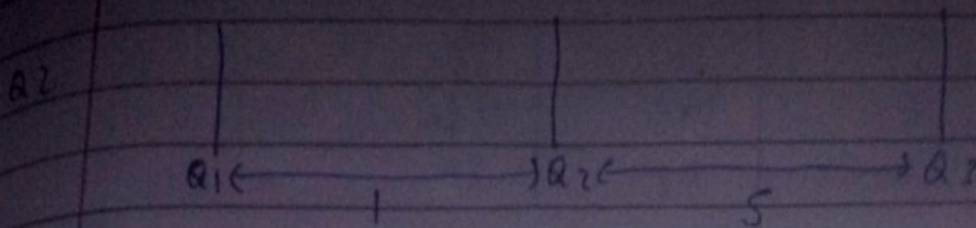
$$Q_{3B} = 61 + \frac{63 - 42}{25} \times 3 = 63.52$$

$$\text{Median}_B = 61 + \frac{42 - 42}{25} \times 3 = 61$$

$$S_{kewB} = \frac{63.52 + 58.14 - 2 \times 61}{63.52 - 58.14} = \frac{-0.34}{5.38}$$

$$= -0.67$$

Section B is more skewed



$$Q_2 - Q_1 = 5(Q_3 - Q_2)$$

$$Q_2 - Q_1 = 5Q_3 - 5Q_2$$

$$Q_1 - 6Q_2 + 5Q_3 = 0$$

$$Q_3 + Q_1 = 6Q_2 - 4Q_3$$

$$Q_1 = 6Q_2 - 5Q_3$$

$$S_k = \frac{(Q_3 - Q_2) - (Q_2 - Q_1)}{Q_3 - Q_1}$$

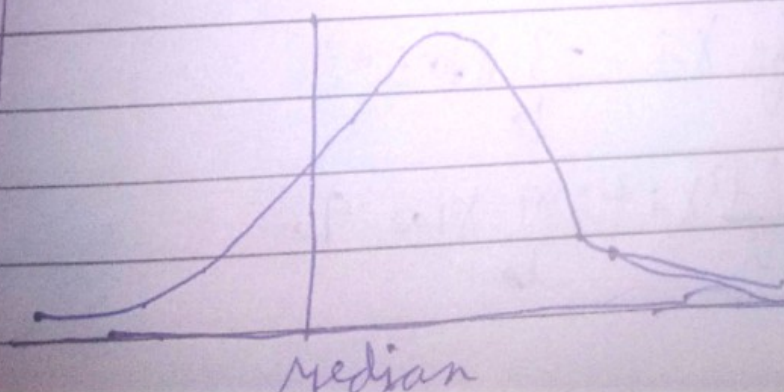
$$= \frac{5Q_2 - Q_1 - 4Q_3 - Q_2 + Q_1}{Q_3 - Q_1}$$

$$= \frac{4Q_2 - 4Q_3}{Q_3 - Q_1} = \frac{4Q_2 - 4Q_3}{Q_3 - (6Q_2 - 5Q_3)}$$

$$= \frac{4Q_2 - 4Q_3}{-6Q_2 + 6Q_3} = \frac{4(Q_2 - Q_3)}{-6(Q_2 - Q_3)}$$

$$= \frac{4}{-6} = -\frac{2}{3} = -0.67$$

It is negatively skewed



Q3	Measure	Place A	Place B
	Mean	150	170
	Median	142	155
	SD	30	55
	Q3	195	260
	Q1	62	80

$$Skp(A) = \frac{3(150 - 142)}{30} = 0.8$$

$$Skp(B) = \frac{3(170 - 155)}{55} = -0.818$$

$$Sk(A) = \frac{195 + 62 - 2 \times 142}{195 - 62} = -0.203$$

$$Sk(B) = \frac{260 + 80 - 2 \times 155}{260 - 80} = 0.167$$

Q4	x	f	x	x-A	d	fd	fd ²	fd ³	fd ⁴
	0-10	1	5	-20	-2	-2	4	-8	16
	10-20	3	15	-10	-1	-3	3	-3	3
	20-30	4	25	0	0	0	0	0	0
	30-40	2	35	10	1	2	2	2	2
		10				-3	9	-9	21

Moments

$$m_1' = \frac{\sum fd}{N} = \frac{-3}{10} = -0.3$$

$$m_2' = \frac{\sum fd^2}{N} = \frac{9}{10} = 0.9$$

$$\mu_3' = \frac{\sum fd^3 \times i^3}{N} = \frac{-7 \times 1000}{10} = -900$$

$$\mu_4' = \frac{\sum fd^4 \times i^4}{N} = \frac{21 \times 10000}{10} = 2100$$

Central Moments

$$\mu_1 = 0$$

$$\mu_2 = 90 - (-3)^2 = 90 - 9 = 81$$

$$\begin{aligned} \mu_3 &= -900 - 3(-3)(90) + 2(-3)^3 \\ &= -900 + 810 - 54 = -144 \end{aligned}$$

$$\begin{aligned} \mu_4 &= 21000 - 4(-3)(-900) + 6(90)(-3)^2 - 3(-3)^4 \\ &= 21000 - 10800 + 4860 - 243 \\ &= 14817 \end{aligned}$$

qs	x	f	x-A	d	fd	fd ²	fd ³	fd ⁴
	20-30	5	-30	-3	-15	45	-135	405
	30-40	14	-20	-2	-28	56	-112	224
	40-50	20	-10	-1	-20	20	-20	20
	50-60	25	0	0	0	0	0	0
	60-70	17	10	1	17	17	17	17
	70-80	11	20	2	22	44	88	176
	80-90	8	30	3	24	72	216	678
		100			0	254	54	1490

Moments

$$\mu_1' = \frac{0}{100} \times 100 = 0$$

$$\mu_2' = \frac{254}{100} \times 100 = 254$$

$$\mu_3' = \frac{54}{100} \times 1000 = 540$$

$$\mu_4' = \frac{1490}{100} \times 10000 = 149000$$

Central Moments

$$\mu_1 = 0$$

$$\mu_2 = 254 - 0 = 254$$

$$\mu_3 = 540 - 0 + 0 = 540$$

$$\mu_4 = 149000 - 0 + 0 - 0 = 149000$$

$$\gamma_1 = \frac{\mu_3}{\mu_2^{3/2}} = 0.133$$

$$\beta_1 = 0.0177$$

$$\beta_2 = \frac{\mu_4}{\mu_2^2} = 2.31$$