

7.4 Answers

A-level Statistics : Year 1 Partitioning Data

7.4.1 Solutions (Introductory Example)

$$(i) \quad \mu_o = \frac{\Sigma x}{f} = \frac{1990}{6} = \frac{995}{3} = 331\frac{2}{3}$$

$$\sigma_o = \sqrt{\frac{\Sigma x^2}{f} - \mu^2} = \sqrt{\frac{674662}{6} - \left(\frac{995}{3}\right)^2} = 49.4$$

(ii)

x_o	X_t	X_t^2
337	9	81
333	8	64
305	1	1
353	13	169
249	-13	169
413	28	784
Σ	46	1268

(iii)

$$\mu_o = \frac{\Sigma x}{f} = \frac{46}{6} = \frac{23}{3} = 7\frac{2}{3}$$

$$\sigma_o = \sqrt{\frac{\Sigma x^2}{f} - \mu^2} = \sqrt{\frac{1268}{6} - \left(\frac{23}{3}\right)^2} = 12.4$$

(iv)

$$\begin{aligned} \mu_o &= 4\mu_t + 301 \\ &= 4 \times \frac{23}{3} + 301 \\ &= 331\frac{2}{3} \end{aligned}$$

(v)

$$\begin{aligned} \sigma_o &= 4\sigma_t \\ &= 4 \times 12.4 \\ &= 49.4 \end{aligned}$$

7.4.2 Solutions to the Exercise (7.3 Exercise)

Answer 1

The original mean, $\mu_o = 610$

The original standard deviation, $\sigma_o = 256$

Answer 2

(i) $\mu_t = 8.87$ and $\sigma_t = 1.4046$

(ii) $\mu_o = \text{£ } 89\,100$ and $\sigma_o = \text{£ } 14\,046$

(iii) $\text{£ } 61\,008$ and $\text{£ } 117\,192$

Answer 3

(i)

Time minutes	N° girls	Mid-Interval minutes	Coding $y = (t - 7) / 3$			
	f	t	y	y^2	fy	fy^2
$2 \leq t < 6$	5	4	-1	1	-5	5
$6 \leq t < 8$	14	7	0	0	0	0
$8 \leq t < 12$	8	10	1	1	8	8
$12 \leq t < 20$	2	16	3	9	6	18
Σ			3	11	9	31

(ii) $\mu_{coded} = \frac{9}{29}$ (about 0.31) and $\sigma_{coded} = 0.986$

(iii) $\mu_{original} = 7.93$ and $\sigma_{original} = 2.93$

Answer 4

(a) 60

(b) $Q_1 = 46$ $Q_2 = 56$ $Q_3 = 64$

(c) mean is 55.48... or $\frac{2497}{45}$
standard deviation is

$$\sqrt{\frac{143369}{45} - \left(\frac{2497}{45}\right)^2}$$

= 10.342... if rounded off mean used

= 10.459..., if exact mean used

(d) skew is negative

reason requested may include

- $Q_2 - Q_1 > Q_3 - Q_2$ perhaps with part (b) numbers
- median closer to upper quartile than lower quartile
- mean < median < mode
- (mean - median) / standard deviation < 0

(e) scaled mean = 45, scaled standard deviation = 9