

Statistics 3 - Coding Solutions

Section 1

$$1, \quad \bar{x} = \frac{248}{30} = 8.266 \quad \text{s.d.} = \sqrt{\frac{2361}{30} - \left(\frac{248}{30}\right)^2}$$
$$= 8.27 \quad = \underline{3.22}$$

$$2, \quad \bar{h} = 45.2 \quad \sigma_h = 11.3 \quad \bar{t} = 12.7 \quad \sigma_t = 20.5$$

In the week Hannah spends a lot longer on her 'phone than Tom, on average almost 3 times more than Tom. As Tom's standard deviation is higher than Hannah's this shows that the times he spends on his 'phone are more varied than Hannah's times.

$$3, \quad \frac{3+\sqrt{24}}{3-\sqrt{6}} = \frac{(3+\sqrt{24})}{(3-\sqrt{6})} \times \frac{(3+\sqrt{6})}{(3+\sqrt{6})} = \frac{9 + 3\sqrt{6} + 3\sqrt{24} + \sqrt{6}\sqrt{24}}{9 - 3\sqrt{6} + 3\sqrt{6} - 6}$$

$$\frac{3\sqrt{24}}{3\sqrt{4}\sqrt{6}} \Rightarrow \frac{9 + 3\sqrt{6} + 6\sqrt{6} + \sqrt{144}}{9 - 6} = \frac{9 + 9\sqrt{6} + 12}{3}$$
$$= \frac{21 + 9\sqrt{6}}{3} = \underline{7 + 3\sqrt{6}}$$

$$4, \quad \begin{array}{l} 2x + y = 3 \quad (1) \rightarrow (1) \quad y = 3 - 2x \\ x^2 + y^2 = 18 \quad (2) \quad \text{into } (2) \end{array}$$

$$x^2 + (3 - 2x)^2 = 18$$
$$x^2 + 9 - 6x - 6x + 4x^2 = 18$$

$$5x^2 - 12x + 9 - 18 = 0$$

$$5x^2 - 12x - 9 = 0$$

$$(5x+3)(x-3) = 0$$

$$x = -\frac{3}{5} \quad x = 3$$

$$y = 3 - 2\left(-\frac{3}{5}\right)$$

$$y = 3 - 2(3)$$

$$y = 3 - 6$$

$$y = \frac{21}{5} = 4.2$$

$$y = -3$$

Section 2

1, $\bar{x}_c = 16$ ✓ $s.d._c = 3.817$ ✓ ✓ (3)

$$F = 1.8C + 32$$

$$\bar{x}_F = 1.8 \times 16 + 32$$

$$= 60.8$$

✓ (1)

$$s.d._F = 1.8 \times 3.817$$

$$= 6.8706$$

$$= 6.9$$

✓ (1)

2,

Life (hours)	590-599	600-609	610-619	620-629	630-639	640-649	650-659	660-669
L (midpoint)	594.5	604.5	614.5	624.5	634.5	644.5	654.5	664.5
x	0	1	2	3	4	5	6	7
Frequency	4	9	23	41	81	29	9	4

a, b, see table.

c, $\bar{x} = 3.5$ ✓ $s.d._x = 2.29$ ✓ ✓ (2)

d, $x = \frac{L - 594.5}{10}$, so $L = 10x + 594.5$

$$\bar{L} = 10 \times 3.5 + 594.5 = 629.5$$

$$s.d._L = 10 \times 2.29 = 22.9$$

3. Using a code - Saves time / effort / simplifies calculations

- Can be used when values are being converted e.g. $^{\circ}\text{C} \rightarrow ^{\circ}\text{F}$
inches \rightarrow cm.

b, No, it is not inaccurate to use a code for data. Each of the data is 'amended' in the same way using the code so as long as the code is used consistently and for the mean & standard deviation it is accurate.

4, a, $S_{xx} = \sum (x - \bar{x})^2 = 158$ (In formula book (at!))

b, $sd = \sqrt{\frac{S_{xx}}{n}} = \sqrt{\frac{158}{20}} = 2.81$

c, $x = \frac{p}{5} - 3$, so $p = (x + 3) \times 5$

$$\bar{p} = (\bar{x} + 3) \times 5$$

$\bar{x} = 65$ i, $\bar{p} = (65 + 3) \times 5 = 340$

ii, $\sigma_p = (\sigma_x) \times 5 = 2.81 \times 5 = 14.05$

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