Statistics 4 - Coding Solutions

Section 1

1, $\bar{x} = \frac{248}{30} = 8.266\dot{}$

$= 8.27$

$sd = \sqrt{\frac{2361}{30} - \left(\frac{248}{30}\right)^2}$

$= 3.22$

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

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

$3\sqrt{24}$
$3\sqrt{4}\sqrt{6}$
$6\sqrt{6}$

$\Rightarrow \frac{9+3\sqrt{6}+6\sqrt{6}+\sqrt{144}}{9-6} = \frac{9+9\sqrt{6}+12}{3}$

$= \frac{21+9\sqrt{6}}{3} = 7+3\sqrt{6}$

4, $2x + y = 3$ ① $\longrightarrow$ ① $y = 3-2x$

$x^2 + y^2 = 18$ ② into ②

$(3-2x)(3-2x)$

$x^2 + (3-2x)^2 = 18$

$x^2 + 9 - 6x - 6x + 4x^2 = 18$

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

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

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

$x=-3/5$ $\quad x=3$

$y=3-2(-3/5)$ $\quad y=3-2(3)$

$y=3-6$

$y=\frac{21}{5}=4.2$ $\quad y=-3$

Section 2

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

$F=1.8C+32$

$\bar{x}_F=1.8\times16+32$

$=60.8$

✓ (1)

$s.d_F=1.8\times3.817$

$=6.8706$

$=6.9$ ✓ (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, $\bar{x}=3.5$ ✓ $\quad s.d_x=2.29$ ✓ (2)

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

$\bar{L}=10\times3.5+594.5=629.5$ ✓ $\quad s.d_L=10\times2.29=22.9$ ✓

3a Using a code – Saves time / effort / simplifies calculations ✓

– Can be used when values are being converted e.g. °C → °F ✓
inches → 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. ✓ ✓ (3)

4, a, $S_{xx} = \Sigma(x-\bar{x})^2 = 158$ (In formula book (ot!) ✓ (1)

b, $s.d = \sqrt{\frac{S_{xx}}{n}} = \sqrt{\frac{158}{20}} = 2.81$ ✓ ✓ (2)

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

$\bar{p} = (\bar{x}+3) \times 5$ ✓

$\bar{x} = 65$ i, $\bar{p} = (65+3) \times 5 = 340$ ✓ (2)

ii, $\sigma_p = (\sigma_x) \times 5 = 2.81 \times 5 = 14.05$ ✓ ✓ (2)

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