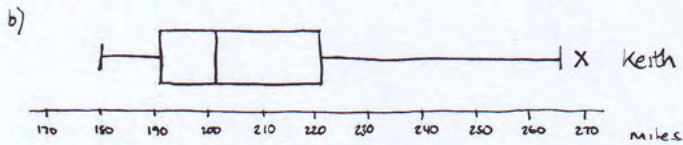
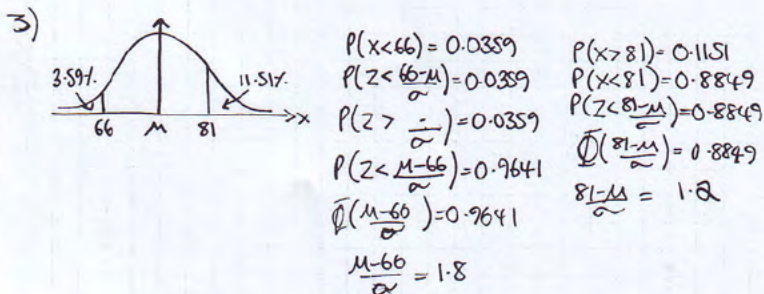


- 1) Keith $n = 43$ $Q_2 \Rightarrow \frac{2}{4}n = 21.5 \Rightarrow Q_2 = X_{22} = \underline{202}$
 Asif $n = 42$ $Q_1 = \frac{1}{4}n = 10.5 \Rightarrow Q_1 = X_{11} = \underline{202}$
 $Q_3 = \frac{3}{4}n = 31.5 \Rightarrow Q_3 = X_{32} = \underline{233}$
 Lower limit = $191 - 1.5(221 - 191) = 146$ no outliers
 Upper limit = $221 + 1.5(221 - 191) = 266$ 269 is an outlier



- c) Keith, positive skew $Q_2 - Q_1 < Q_3 - Q_2$
 (11) < (19)
 Asif, slight negative skew $Q_2 - Q_1 > Q_3 - Q_2$
 (16) > (15)

- 2) $b = \frac{S_{xy}}{S_{xx}} = \frac{3477.6}{4402} = 0.79$ $a = \bar{y} - b\bar{x} = 28.6 - 0.79 \times 36 = 0.16$
 $y = 0.16 + 0.79x$ b) $y = 0.16 + 0.79 \times 45 = \underline{35.7}$

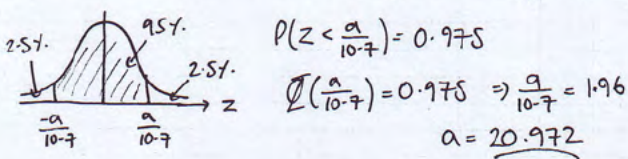


- 6) $S_{xx} = \sum x^2 - \frac{(\sum x)^2}{n} = 10164 - \frac{272^2}{8} = \underline{916}$
 $S_{yy} = \sum y^2 - \frac{(\sum y)^2}{n} = 13464 - \frac{320^2}{8} = \underline{664}$
 $S_{xy} = \sum xy - \frac{(\sum x)(\sum y)}{n} = 11222 - \frac{(272)(320)}{8} = \underline{342}$
 b) $r = \frac{S_{xy}}{\sqrt{S_{xx} \times S_{yy}}} = \frac{342}{\sqrt{916 \times 664}} = \underline{0.439}$

c) Slight evidence to suggest positive correlation.

d) $\bar{x} = \frac{\sum x}{n} = \frac{272}{8} = 34$ $s.d._x = \sqrt{\frac{\sum x^2}{n} - \bar{x}^2} = \sqrt{\frac{10164}{8} - 34^2} = \underline{10.7}$

e) $P(\mu - a < X < \mu + a) \Rightarrow P(\frac{\mu - a - \mu}{\sigma} < Z < \frac{\mu + a - \mu}{\sigma}) = P(\frac{-a}{\sigma} < Z < \frac{a}{\sigma})$



E) press ups are not continuous data, so normal distribution is not appropriate.

$\frac{\mu - 66 = 1.8\sigma}{81 - \mu = 1.2\sigma} +$
 $15 = 3\sigma \Rightarrow \sigma = \underline{5}$

ii) $M = 1$
 $M = 1.8\sigma$

c) $P(69 < X < 83) \Rightarrow P(\frac{69 - 75}{5} < Z < \frac{83 - 75}{5}) = P(-1.2 < Z < 1.6)$
 $= \Phi(1.6) - \Phi(-1.2) = \Phi(1.6) - (1 - \Phi(1.2)) = 0.9452 - 0 = \underline{0.8301}$

4)

X	-3	-2	-1	0	1	2	$\sum P = 1$
P	0.2	0.2	α	α	0.1	0.1	$\Rightarrow 0.6 + 2\alpha = 1$
$\times \downarrow$	0.2	0.2	0.2	0.2	0.1	0.1	$\Rightarrow \alpha = 0.2$

 $E(X) = -0.6 + 0.4 + 0.2 + 0 + 0.1 + 0.2 = \underline{-0.9}$

$E(X^2) = 1.8 + 0.8 + 0.2 + 0 + 0.1 + 0.4 = \underline{3.3}$

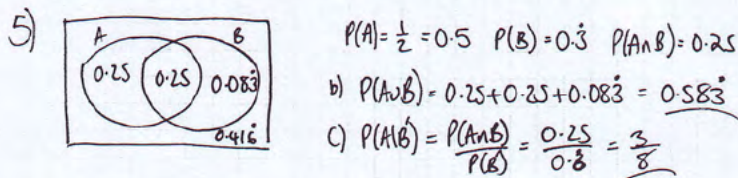
e) $V(X) = E(X^2) - E(X)^2 = 3.3 - (-0.9)^2 = \underline{2.49}$

b) $P(-1 \leq X < 2) = P(1) + P(0) + P(-1) = 0.1 + 0.2 + 0.2 = \underline{0.5}$

c) $F(0.6) = P(0) + P(-1) + P(-2) + P(-3) = 0.2 + 0.2 + 0.2 + 0.2 = \underline{0.8}$

d) $E(aX + 3) = 1.2 \Rightarrow aE(X) + 3 = 1.2 \Rightarrow aX - 0.9 = -1.8 \Rightarrow a = \underline{2}$

f) $V(3X - 2) = 3^2 V(X) = 9 \times 2.49 = \underline{22.41}$



7)

time	freq	CW	f.d.
40-44	10 (60)	5	2
45-47	15 (25)	3	5
48	23 (48)	1	23
49-51	21 (69)	3	7
52-55	16 (85)	4	4
56-60	15 (100)	5	3

a) Continuous data with different class widths

b) 40-44

Upper boundary = 44.5
 Lower boundary = 39.5

