

• 51 Nov 04

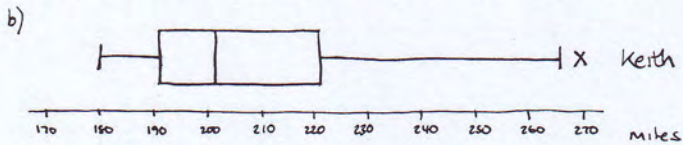
(1)

1) Keith  $n=43$   $Q_2 \Rightarrow \frac{2}{4}n = 21.5 \Rightarrow Q_2 = X_{22} = 202$

Asif  $n=42$   $Q_1 = \frac{1}{4}n = 10.5 \Rightarrow Q_1 = X_{11} = 202$

$Q_3 = \frac{3}{4}n = 31.5 \Rightarrow Q_3 = X_{32} = 233$

Lower limit =  $191 - 1.5(221 - 191) = 146$  no outliers  
Upper limit =  $221 + 1.5(221 - 191) = 266$  269 is an outlier

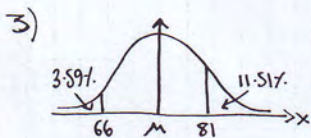


c) Keith, positive skew  $Q_2 - Q_1 < Q_3 - Q_2$   
(11) < (19)

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)  $y = 0.16 + 0.79 \times 45 = 35.7$



$P(X < 66) = 0.0359$      $P(X > 81) = 0.1151$   
 $P(Z < \frac{66 - \mu}{\sigma}) = 0.0359$      $P(Z < \frac{81 - \mu}{\sigma}) = 0.8849$   
 $P(Z > \frac{\cdot}{\cdot}) = 0.0359$      $P(Z < \frac{81 - \mu}{\sigma}) = 0.8849$   
 $P(Z < \frac{\mu - 66}{\sigma}) = 0.9641$      $\Phi(\frac{81 - \mu}{\sigma}) = 0.8849$   
 $\Phi(\frac{\mu - 60}{\sigma}) = 0.9641$      $\frac{81 - \mu}{\sigma} = 1.2$   
 $\frac{\mu - 66}{\sigma} = 1.8$

6)  $S_{xx} = \sum x^2 - \frac{(\sum x)^2}{n} = 10164 - \frac{272^2}{8} = 916$

$S_{yy} = \sum y^2 - \frac{(\sum y)^2}{n} = 13464 - \frac{320^2}{8} = 664$

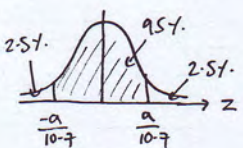
$S_{xy} = \sum xy - \frac{(\sum x)(\sum y)}{n} = 11222 - \frac{(272)(320)}{8} = 342$

b)  $r = \frac{S_{xy}}{\sqrt{S_{xx} \times S_{yy}}} = \frac{342}{\sqrt{916 \times 664}} = 0.439$

d) Slight evidence to suggest positive correlation.

1)  $\bar{x} = \frac{\sum x}{n} = \frac{272}{8} = 34$      $sd_x = \sqrt{\frac{\sum x^2}{n} - \bar{x}^2} = \sqrt{\frac{10164}{8} - 34^2} = 10.7$

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



$P(Z < \frac{a}{10.7}) = 0.975$   
 $\Phi(\frac{a}{10.7}) = 0.975 \Rightarrow \frac{a}{10.7} = 1.96$   
 $a = 20.972$

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

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

ii)  $\mu = 1.8\sigma + 66$   
 $\mu = 1.8 \times 5 + 66 = 75$

c)  $P(69 < X < 83) \Rightarrow P(\frac{69 - 75}{5} < Z < \frac{83 - 75}{5}) = P(-1.2 < Z < 1.6)$   
 $= \Phi(1.6) - \Phi(-1.2) = \Phi(1.6) - (1 - \Phi(1.2)) = 0.9452 - 0.1151 = 0.8301$

4)  $X$     -3    -2    -1    0    1    2     $\sum P = 1$   
 $P$     0.2    0.2     $\alpha$      $\alpha$     0.1    0.1     $\Rightarrow 0.6 + 2\alpha = 1$   
 $\Rightarrow \alpha = 0.2$

$E(X) = -0.6 + 0.4 + 0.2 + 0 + 0.1 + 0.2 = -0.9$

$X^2$     9    4    1    0    1    4  
 $P$     0.2    0.2    0.2    0.2    0.1    0.1

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

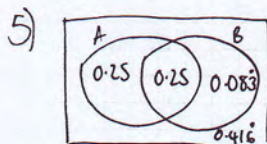
e)  $V(X) = E(X^2) - E(X)^2 = 3.3 - (-0.9)^2 = 2.49$

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

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

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

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



$P(A) = \frac{1}{2} = 0.5$      $P(B) = 0.3$      $P(A \cap B) = 0.25$

b)  $P(A \cup B) = 0.25 + 0.25 + 0.0833 = 0.5833$

c)  $P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{0.25}{0.3} = \frac{5}{6}$

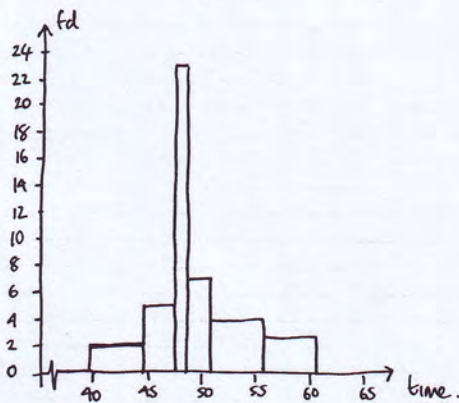
(3)

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



(4)