

1.  $\sum x = 256$   $\bar{x} = 25.6$  (25.6, 246.5)  
 $\sum y = 2465$   $\bar{y} = 246.5$  ( $\bar{x}, \bar{y}$ )

b)  $S_{xx} = \sum x^2 - \frac{(\sum x)^2}{n} = 7266 - \frac{256^2}{10} = 712.4$

$S_{xy} = \sum xy - \frac{(\sum x)(\sum y)}{n} = 69798 - \frac{(256)(2465)}{10} = 6694$

c)  $b = \frac{S_{xy}}{S_{xx}} = 9.40$   $a = \bar{y} - b\bar{x} = 5.95$

$y = 5.95 + 9.40x$   $x=0 \Rightarrow y = 5.95$  (0, 5.95)  
 $x=40 \Rightarrow y = 381.8$  (40, 381.8)

ii)  $b = 9.40 \Rightarrow$  additional £9.40 in salary per extra 1 performance score point.

e)  $x=35 \Rightarrow y = 334.95 \Rightarrow \underline{\underline{\pounds 334.95}}$

2)  $P(M) = 0.4$   
 $P(HM) = 0.6 \times 0.4 = 0.24$   
 $P(HHM) = 0.6 \times 0.6 \times 0.4 = 0.144$   
 $P(HHH) = 0.6 \times 0.6 \times 0.6 = 0.216$  a) 0.216

b)

X	0	10	20	30
P	0.4	0.24	0.144	0.216

$E(x) = 0 + 2.4 + 2.88 + 6.48 = 11.76$

$x^2$	0	100	400	900
P	0.4	0.24	0.144	0.216

$E(x^2) = 0 + 24 + 57.6 + 194.4 = 276$

$V(x) = E(x^2) - E(x)^2 = 276 - 11.76^2 = 137.7$  ②

s.d.  $\sigma = \sqrt{\text{Var}(x)} = 11.73$  mean = 11.76 s.d. = 11.73

3)  $N \sim W(505, 10)$

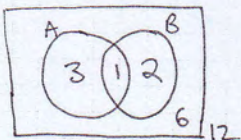
$P(W < 500) \Rightarrow P(Z < \frac{500 - 505}{10}) = P(Z < -0.5) = \Phi(-0.5)$   
 $= 1 - \Phi(0.5) = 1 - 0.6915 = \underline{\underline{0.3085}}$

(ii)  $30 \times 0.3085 = 9.255 \Rightarrow 9$  jars

4) Sample space  $\Rightarrow$  a set of all possible outcomes:  
 Event  $\Rightarrow$  a possible outcome

b) Independent  $\Rightarrow P(A \cap B) = P(A) \times P(B) = \frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$

$P(A) = \frac{1}{3} = \frac{4}{12}$   $P(B) = \frac{1}{4} = \frac{3}{12}$



$P(A|B) = \frac{1}{2} = \frac{1}{3}$

$P(A \cup B) = \frac{3+1+2}{12} = \frac{6}{12} = \frac{1}{2}$

3b)  $P(W < 500) = 1\% = 0.01 \Rightarrow P(Z < \frac{500 - \bar{w}}{10}) = 0.01$

$\Rightarrow P(Z < \frac{\bar{w} - 500}{10}) = 0.99 = \Phi(\frac{\bar{w} - 500}{10})$

$\Rightarrow \frac{\bar{w} - 500}{10} = 2.32 \Rightarrow \bar{w} = 2.32 \times 10 + 500 = \underline{\underline{523.2}}$

5) Uniform distribution  $\Rightarrow E(x) = \frac{n+1}{2}$

$S = \frac{n+1}{2} \Rightarrow n+1 = 10 \Rightarrow \underline{\underline{n=9}}$

X	1	2	3	4	5	6	7	8	9
P	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$

$P(x < 7) = \frac{6}{9} = \frac{2}{3}$

$V(x) = \frac{(n+1)(n-1)}{12} = \frac{10 \times 8}{12} = \frac{80}{12} = \underline{\underline{6.67}}$

6)  $\sum x = 12075$   $\bar{x} = \frac{\sum x}{n} = \frac{12075}{15} = \underline{\underline{805}}$

$\sum x^2 = 15499685$   $V(x) = \frac{\sum x^2}{n} - \bar{x}^2$

$V(x) = 385287.3$

s.d.  $\sigma = \sqrt{\text{Var}(x)} = \underline{\underline{620.7}}$

b)  $Q_1 \Rightarrow \frac{1}{4}n = 3.75 \Rightarrow Q_1 = x_{4.75} = 350$

$Q_2 = \frac{2}{4}n = 7.5 \Rightarrow Q_2 = x_{7.5} = \underline{\underline{650}}$

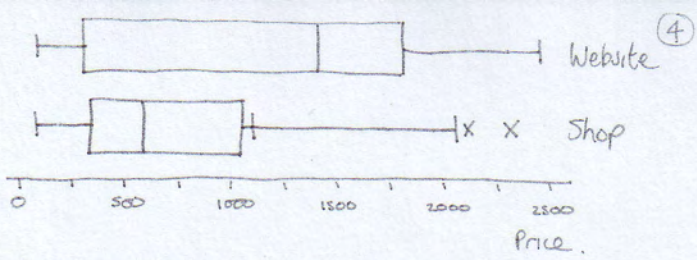
$Q_3 = \frac{3}{4}n = 11.25$   $Q_3 = x_{11.25} = 1015$

$IQR = 1015 - 350 = \underline{\underline{665}}$

lower limit =  $Q_1 - 1.5IQR = -647.5$ , NO outliers

upper limit =  $Q_3 + 1.5IQR = 2012.5$ , 2100, 2315 are outliers.

\* 3b)  $P(W < 500) = 1\% = 0.01 \Rightarrow P(Z < z)$



- e) Shop is positive skew, website negative skew.  
median cost on website is much higher  
website has much wider range of prices