• S1 JUNE 04 (1)

1)

+	1	2	2	3	3	3
1	2	3	3	4	4	4
2	3	4	4	(5)	(5)	(5)
2	3	4	4	(5)	(5)	(5)
3	4	(5)	(5)	(6)	(6)	(6)
3	4	(5)	(5)	(6)	(6)	(6)
3	4	(5)	(5)	(6)	(6)	(6)

$P(\text{At least 5}) = \frac{21}{36} = \frac{7}{12}$

2) $h \to x \quad c \to y \qquad \Sigma h = 1562 \quad \Sigma c = 5088$

$S_{hc} = \Sigma hc - \frac{(\Sigma h)(\Sigma c)}{n} = 884484 - \frac{(1562)(5088)}{9} = 1433\frac{1}{3}$

$S_{hh} = \Sigma h^2 - \frac{(\Sigma h)^2}{n} = 272094 - \frac{1562^2}{9} = 1000.2$

$S_{cc} = \Sigma c^2 - \frac{(\Sigma c)^2}{n} = 2878966 - \frac{5088^2}{9} = 2550$

c) $r = \frac{S_{hc}}{\sqrt{S_{hh} \times S_{cc}}} = \frac{1433\frac{1}{3}}{\sqrt{1000.2 \times 2550}} = 0.897$

d) reasonable evidence to suggest positive correlation.

e) $b = \frac{S_{hc}}{S_{hh}} = \frac{1433\frac{1}{3}}{1000.2} = 1.433$ $\quad a = \bar{c} - b\bar{h} = \left(\frac{5088}{9}\right) - 1.433\left(\frac{1562}{9}\right)$

$a = 316.6$

$c = 316.6 + 1.433h$

f) $h = 180$, $c = 316.6 + 1.433 \times 180 \Rightarrow c = 574.5$ g) 161–193

(3)

d) first have a much higher % attendance
Second has a much larger spread
first negative skew, second slight positive skew
One student in second attends every day.

5) $t \sim N(90, \sigma^2) \quad P(t > 125) = 0.2 \Rightarrow P(t < 125) = 0.8$

$P\left(z < \frac{125-90}{\sigma}\right) = 0.8 \Rightarrow P\left(z < \frac{35}{\sigma}\right) = 0.8$

$\Phi\left(\frac{35}{\sigma}\right) = 0.8 \Rightarrow \frac{35}{\sigma} = 0.84 \Rightarrow \sigma = \frac{35}{0.84} = 41\frac{2}{3}$

b) $P(t < 25) \Rightarrow P\left(z < \frac{25-90}{41\frac{2}{3}}\right) = P(z < -1.56)$

$= \Phi(-1.56) = 1 - \Phi(1.56) = 0.0594$

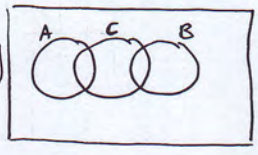
c) $\mu \pm 3\sigma \Rightarrow$ 99% of people stay upto 215 min
$\mu \pm 2\sigma \Rightarrow$ 95% of people stay upto 173 min
$\mu + 1\sigma \Rightarrow$ 68% of people stay upto 132 min
So as Tara only has 2hrs the normal distribution does not seem reasonable.

6) $P(A) = 0.2 \quad P(B) = 0.4 \quad P(A \cup C) = 0.7 \quad P(A \cap B) = 0$

$P(A) \times P(C) = P(A \cap C)$

b) $P(A|C) = \frac{P(A \cap C)}{P(C)} = \frac{P(A)P(C)}{P(C)} = P(A)$

$P(A|C) = 0.2$



(2)

3)

x	0	1	2	3
P	0.2	0.3	b	a

$\Sigma P = 1 \Rightarrow a + b = 0.5$

$E(X) = 0 + 0.3 + 2b + 3a = 1.7 \Rightarrow 3a + 2b = 1.4$

$2a + 2b = 1$

$a = 0.4$

$b = 0.1$

x^2	0^2	1^2	2^2	3^2
P	0.2	0.3	0.1	0.4

$E(X^2) = 0 + 0.3 + 0.4 + 3.6 = 4.3$

d) $V(X) = E(X^2) - E(X)^2 = 4.3 - 1.7^2 = 1.41$

b) $P(0 < X < 1.5) = P(1) = 0.3$

c) $E(2X-3) = 2E(X) - 3 = 2 \times 1.7 - 3 = 0.4$

e) $V(2X-3) = 2^2 V(X) = 4 \times 1.41 = 5.64$

4) b)

First		Second	
(3)	444	1	4
(4)	SSSS	1	S
(3)	666	1	666
(1)	7	1	77777
(3)	888	1	888888
(1)	9	1	
(1)	0	2	
n=16			

First 1|6 means 16 Second 8|1 means 18

(1)	
(1)	
(3)	
(5)	
(6)	
n=16	

Mean% $= \frac{16.875 \times 16}{18} = 2$

a) Mean $= \frac{270}{16} = 16.8$

Var $= \frac{4578}{16} - 16.87$

Var $= 1.359375$

Sd. $= \sqrt{\text{Var}} = 1.1659$

c) First mode = 18 $\quad Q_1 \ \frac{1}{4}n = 4 \quad x_4/x_5 = 16$

$Q_2 \ \frac{2}{4}n = 8 \quad x_8/x_9 = 17 \quad IQR = 2$

$Q_3 \ \frac{3}{4}n = 12 \quad x_{12}/x_{13} = 18$

Second mode = 15 $\quad Q_1 \ \frac{1}{4}n = 4 \quad x_4/x_5 = 15$

$Q_2 \ \frac{2}{4}n = 8 \quad x_8/x_9 = 16 \quad IQR = 3$

$Q_3 \ \frac{3}{4}n = 12 \quad x_{12}/x_{13} = 18$

(4)

c) $P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.2 + 0.4 - 0 = 0.6$

d) $P(A \cup C) = P(A) + P(C) - P(A \cap C)$

$0.7 = 0.2 + P(C) - P(A)P(C)$

$0.5 = P(C) - 0.2P(C)$

$0.5 = 0.8P(C)$

$P(C) = \frac{0.5}{0.8} = \frac{5}{8}$