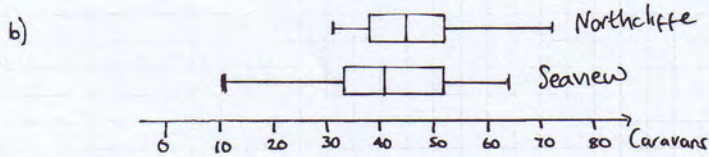


b) $P(\text{not faulty}) = 0.8245 + 0.141 = 0.9655$

- 2) $n=31$
 $Q_1 \Rightarrow \frac{1}{4}n = 7.75 \quad x_8 = 33$
 $Q_2 \Rightarrow \frac{2}{4}n = 15.5 \quad x_{16} = 41$
 $Q_3 \Rightarrow \frac{3}{4}n = 23.25 \quad x_{24} = 52$



c) Northcliffe symmetrical skew, Seaview positive skew. Median/average of Northcliffe slightly higher. Seaview slightly larger spread. Same upper quartile.

①

3) positive \Rightarrow as x increases, y increases.

c) $S_{xy} = \sum xy - \frac{(\sum x)(\sum y)}{n} = 122783 - \frac{(1962)(740)}{12} = 1793$

d) $b = \frac{S_{xy}}{S_{xx}} = \frac{1793}{1745} = 1.028$

e) $\bar{y} = \frac{\sum y}{n} = \frac{740}{12} = 61.67 = 61.7$ (3sf)

$\text{Var}_y = \frac{\sum y^2}{n} - \bar{y}^2 = \frac{47746}{12} - 61.67^2 = 176.05 = 176$

S.d. $y = \sqrt{\text{Var}} = 13.3$ (3sf)

f) $\bar{y} \pm 1.96s = 61.7 \pm 1.96 \times 13.3 \Rightarrow 35.6 - 87.8$

g) Normal distribution seems sensible as all values of y lie within 35.6-87.8. Data is continuous.

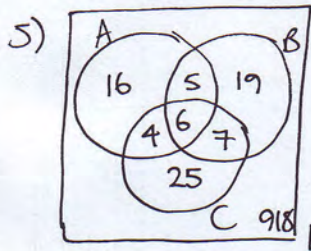
4)

x	1	2	3	4	5
P	$\frac{1}{15}$	$\frac{2}{15}$	$\frac{3}{15}$	$\frac{4}{15}$	$\frac{5}{15}$

a) $\sum P = 1 \Rightarrow \sum ku = 1 \Rightarrow k = \frac{1}{15}$
 b) $P(X < 4) = \frac{1}{15} + \frac{2}{15} + \frac{3}{15} = \frac{6}{15}$

c) $E(x) = \frac{1}{15} + \frac{4}{15} + \frac{9}{15} + \frac{16}{15} + \frac{25}{15} = \frac{55}{15} = \frac{11}{3}$

d) $E(3x-4) = 3(E(x)) - 4 = 3 \times \frac{11}{3} - 4 = 7$



b) no defects = $\frac{918}{1000}$

c) no more than 1 defect = $\frac{918+16+19+25}{1000} = \frac{978}{1000}$

d) $P(\text{Type B | only}) = \frac{P(\text{type B only})}{P(\text{only})} = \frac{19}{\frac{16+19+25}{1000}} = \frac{19}{60}$

e) $P(\text{type B}) = \frac{37}{1000} \Rightarrow$ Two have type B = $\frac{37}{1000} \times \frac{36}{999} = \frac{37}{27750}$

6) a) Uniform discrete random variable

b) throwing a fair dice

c) i) In theory it is true but in reality it may not be.
 ii) Allow problems to be modelled using theoretical probabilities

d) Carry out the experiment and refine the model based on their results.

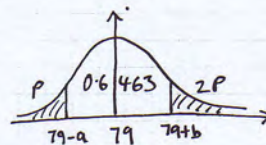
③

7) $\text{Var} = 144 \Rightarrow \text{s.d.} = 12 \quad X \sim N(79, 12^2)$

a) $P(X < 70) \Rightarrow P(Z < \frac{70-79}{12}) = P(Z < -0.75) = \Phi(-0.75) = 1 - \Phi(0.75) = 0.2266$

b) $P(64 < X < 96) \Rightarrow P(\frac{64-79}{12} < Z < \frac{96-79}{12}) = P(-1.25 < Z < 1.42) = \Phi(1.42) - \Phi(-1.25) = \Phi(1.42) - (1 - \Phi(1.25)) = 0.9222 - 0.1056 = 0.8166$

c)



$P + 2P + 0.6463 = 1 \Rightarrow 3P = 0.3537 \Rightarrow P = 0.1179$

d) $P(X < 79+b) = 0.6463 + 0.1179 = 0.7642$

$P(Z < \frac{79+b-79}{12}) = P(Z < \frac{b}{12}) = 0.7642 \Rightarrow \Phi(\frac{b}{12}) = 0.7642 \Rightarrow \frac{b}{12} = 0.72 \Rightarrow b = 864$

④

②