Review Problems.

1- $n = 18$

$X_{(1)} = 34$, $X_{(18)} = 80$ $R = 80 - 34 = 46$

Mean $\bar{x} = \frac{\sum x}{n} = \frac{949}{18} = 52.72$

$S^2 = \frac{USS - CF}{n-1}$

$USS = \underline{53485}$ $CF = \frac{(949)^2}{n=18} = 50033.39$

$S^2 = \frac{53485 - 50033.39}{17}$

$S^2 = 203.036$

$S = \sqrt{S^2} = 14.25$

$\underline{CV} = \frac{S}{\bar{x}}$ (%)

$= 0.27$

27%

$Q_1 = X_{0.25}$

$n \times 0.25 = 18 \times .25 = \underline{4.5} \uparrow 5$

$Q_1 = X_{(5)} = 42$

$Q_3 = X_{0.75} \Rightarrow 18 \times .75 = 13.5 \uparrow 14$

$Q_3 = X_{(14)} = 62$

Review

$\tilde{x} = x_{0.50}$ $n \times 0.5 = 18 \times 0.5 = \underline{\underline{9}}$

9 is an exact integer

$$\tilde{x} = x_{0.50} = \frac{x_{(9)} + x_{(10)}}{2} = \frac{50+52}{2} = 51$$

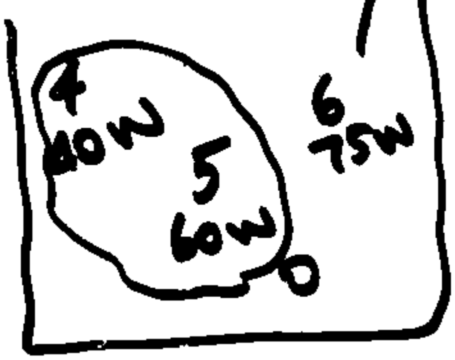
$$IQR = Q_3 - Q_1 = 62 - 42 = 20$$

$x_{0.30} \Rightarrow 18 \times 0.3 = 5.4 \uparrow 6$

$$x_{0.30} = x_{(6)} = 42$$

MODE = 62 w/ 3 occurrences.

<u>Ex. 18 on pg 65</u>



→ 1^{st} trial

Event A = {Picking a 75W bulb on or after the 2^{nd} trial}

A' = {Picking the 75W bulb on the 1^{st} trial}

$$P(A) = 1 - P(A')$$

Total # of bulbs = 15 $P(A') = 6/15$
$= 0.40$

# of 75W bulbs = 6

$$P(A) = 1 - 0.40 = 0.60$$

How to solve this by nb

Event of interest = {pick 75W ≥ 2nd}

Picking a 75w bulb = 1 $P(1) = 6/15 = 0.4$

~~At~~ ~~Not~~ picking a 75w bulb = 0 $P(0) = 9/15 = 0.6$

$nb(x; r, p)$

$$\Sigma \begin{cases} 2 & 1 & 0.4 \\ 3 \\ 4 \\ 5 \\ \vdots \\ \infty \end{cases}$$

OR

$$\underbrace{1 - nb(\underset{1^{st}}{x}; \underset{1^{st}}{r}, \underset{0.4}{p})}_{\text{single value}}$$

75w

P[2 or more trials are required for the 1st pick of a 75 w bulb]

$= 1 - nb(1; 1, .4)$

$= 1 - {}_{x-1}C_{r-1} (p)^r (1-p)^{x-r}$

$= 1 - {}_0C_0 (.4)^1 (.6)^0$

$= 1 - (1)(0.4)(1)$

$= 1 - 0.4 = \underline{0.6}$

$\underline{0! = 1}$

$\underline{x^0 = 1}$

Ex. 26 page 67

a) $P(A_1) = 0.12$ $\quad P(A_1') = ?$

$P(A_1') = 1 - P(A_1) = 1 - 0.12 = 0.88$

b) (b+d)

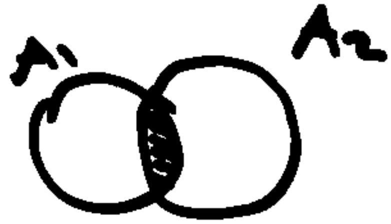
$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$P(A_1 \cap A_2) = ?$$

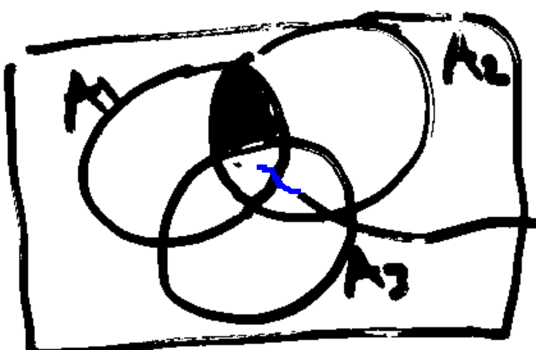
$$\underbrace{P(A_1 \cup A_2)}_{\checkmark} = \underbrace{P(A_1)}_{\checkmark} + \underbrace{P(A_2)}_{\checkmark} - \underbrace{\boxed{P(A_1 \cap A_2)}}_{?}$$

$$P(A_1 \cap A_2) = P(A_1) + P(A_2) - P(A_1 \cup A_2)$$

$$P(A_1 \cap A_2) = \underline{0.06}$$



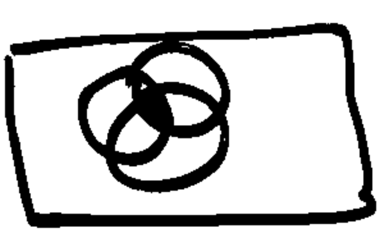
c)



$$P(A_1 \cap A_2 \cap A_3') = \overbrace{P(A_1 \cap A_2)}^{0.06} - \underbrace{P(A_1 \cap A_2 \cap A_3)}_{0.01}$$

$$= 0.05$$

d)



P(having at most 2 defect) $= 1 - 0.01$
$= 0.99$

Ex. 30 pg 73 Review

a) Since order is imp. use $P_{n,k}$

$$P_{n,k} = \frac{n!}{(n-k!)} \quad P_{8,3} = \frac{8!}{5!} = \frac{8 \cdot 7 \cdot 6 \cdot \cancel{5!}}{\cancel{5!}}$$

$$= 336$$

b) Order is not imp.

$${}_nC_k = \frac{P_{n,k}}{k!} \Rightarrow {}_{30}C_6 = \frac{30!}{(30-6)!\,6!}$$

$$= 593,775$$

c) 1st type 2nd type

$$\binom{8}{2} \times \binom{10}{2} \times \binom{12}{2} = 83,160$$

d) $\dfrac{\text{\# of possibilities of having 2 from each type}}{\text{total number of possible outcomes when 6 bottles are picked randomly}} = \dfrac{83,160}{593,775} = 0.14$

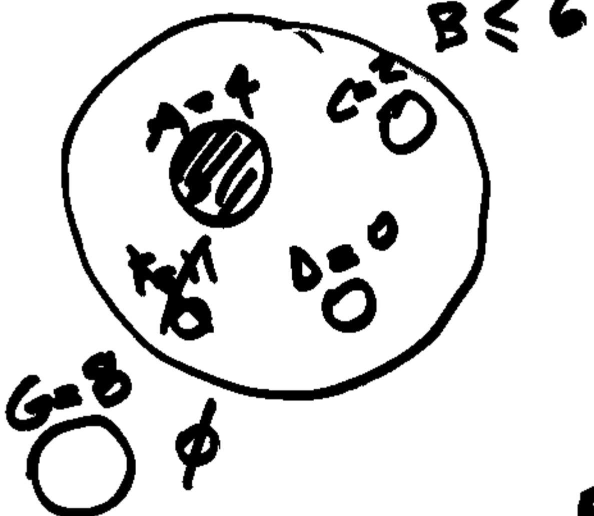
e) $\dfrac{\binom{8}{6}}{593,775} + \dfrac{\binom{10}{6}}{593,775} + \dfrac{\binom{12}{6}}{593,775} = 0.002$

Ex. 48 pg. 126 Review

B= Given at most 6 will stop completely.

$p(\underbrace{\text{exactly 4 will stop}}_{A} \mid B) = ?$

$$P(A|B) = ? = \frac{P(A \cap B)}{P(B)}$$



$$P(A \cap B) = P(A)$$

$$P(A|B) = \frac{P(A)}{P(B)} = \frac{b(4;20,.25)}{P(B)}$$

$P(B) = \underline{0.786}$ (from part a)

$$P(A) = {}_{20}C_4 \, (.25)^4 (.75)^{(20-4)}$$

$$= 0.189685..$$

$$P(A|B) = \frac{0.189685}{.786} = 0.241$$

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f) $P(G|B) = \frac{P(G \cap B)}{P(B)}$ → ϕ $P=0$

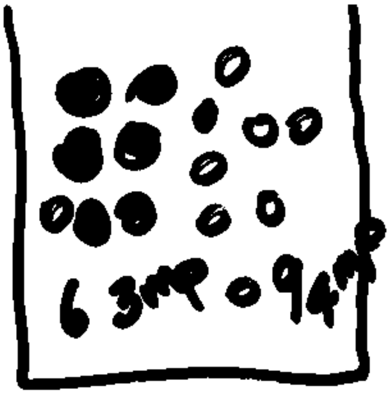
$P(G|B) = 0$!

Ex 64 on pg 133

Batch of 15 cameras

6 3mps

9 4mps



$N = 15$

M = # of items in ~~the~~ population that are of interest.

(# of 3mp cameras)

a) Dist of

X = hypergeometric $M = 6$

X = # of 3mp cameras in the sample

b) $P(X = 2)$ of 5 cameras.

$$P(X=2) = \frac{\binom{6}{2}\binom{9}{5-2}}{\binom{15}{5}} = \underline{0.28}$$

$$P(X \leq 2) = P(X=0) + P(X=1) + \underline{P(X=2)}$$

$$= \frac{\binom{9}{5}}{\binom{15}{5}} + \frac{\binom{6}{1}\binom{9}{4}}{\binom{15}{5}} + 0.28$$

$$= 0.573$$

$$P(X \geq 2) = 1 - P(X \leq 1)$$
$$= 1 - [P(X=0) + P(X=1)]$$
$$= 1 - \left[\frac{126}{3003} + \frac{756}{3003}\right]$$
$$= .706$$

c) $$E(X) = n \cdot \frac{M}{N} = \cancel{5}\,\frac{6}{\cancel{15}\,3} = 2$$

$\sqrt{V(X)}$ $$V(X) = \left(\frac{N-n}{N-1}\right) \cdot n \cdot \frac{M}{N} \cdot \left(1 - \frac{M}{N}\right)$$
$$= \left(\frac{15-5}{15-1}\right)(5)\left(\frac{6}{15}\right)\left(1 - \frac{6}{15}\right)$$

$$= .857$$

$$\text{stdev} = \sqrt{.857} = .926$$