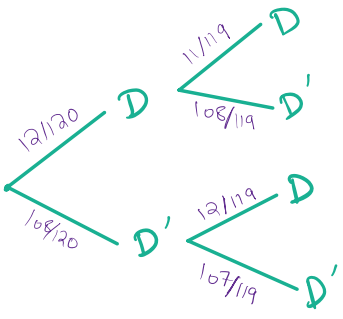
QUESTION 1

(a) $P(D') = \frac{108}{120} = 0.9$

(b) $P(D_2|D_1) = \frac{11}{119} = 0.0924$

(c) $P(D'D') = \frac{108}{120} \times \frac{107}{119} = 0.809$



QUESTION 2

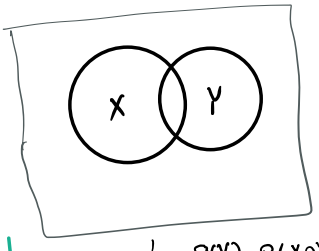
$$P(Y|X) = \frac{P(Y \cap X)}{P(X)}$$

$$P(Y|X') = \frac{P(Y \cap X')}{P(X')}$$

$$\Rightarrow P(Y \cap X') = P(Y|X') \cdot P(X')$$

$$= 0.1 \times 0.4$$

$$= 0.04$$



$P(Y \cap X') = P(Y) - P(X \cap Y)$

$\Rightarrow P(X \cap Y) = P(Y) - P(Y \cap X')$

$P(X \cap Y) = P(X) \cdot P(Y|X)$

$0.6 \times 0.4 = P(Y) - 0.04$

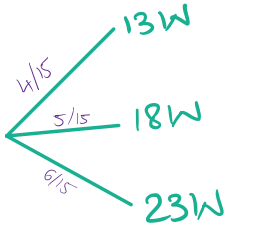
$P(Y) = 0.28$

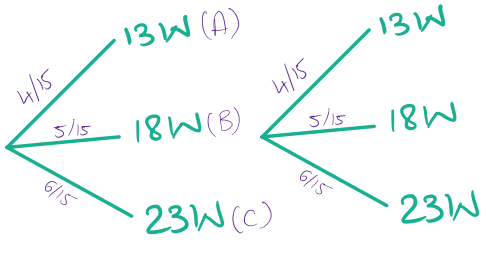
QUESTION 3

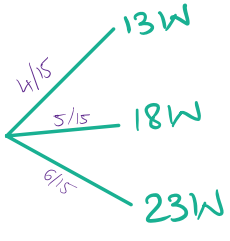
(a) 13W = A
18W = B
23W = C

$P(23W_2) = P(CCA) + P(CCB) + P(CAC) + P(CBC) + P(ACC) + P(BCC)$

$= 6 \times 5 \times 4 + 5) +$







$$\frac{{}^{6}C_{2} * {}^{9}C_{1}}{15 \times 14 \times 13}$$

$$\frac{6}{15} \times \frac{5}{13} \times \left(\frac{4+5}{14}\right) +$$

$$\frac{6}{14} \times \frac{5}{13} \times \left(\frac{4+5}{15}\right)$$

$$P(2 \text{ W}_2) = \frac{30}{15 \times 14}\left(\frac{9}{13}\right) + \frac{30}{15 \times 13}\left(\frac{9}{14}\right) + \frac{30}{14 \times 13}\left(\frac{9}{15}\right)$$

$$= \frac{9}{7 \times 13} + \frac{9}{7 \times 13} + \frac{9}{7 \times 13}$$

$$= \frac{27}{91}$$

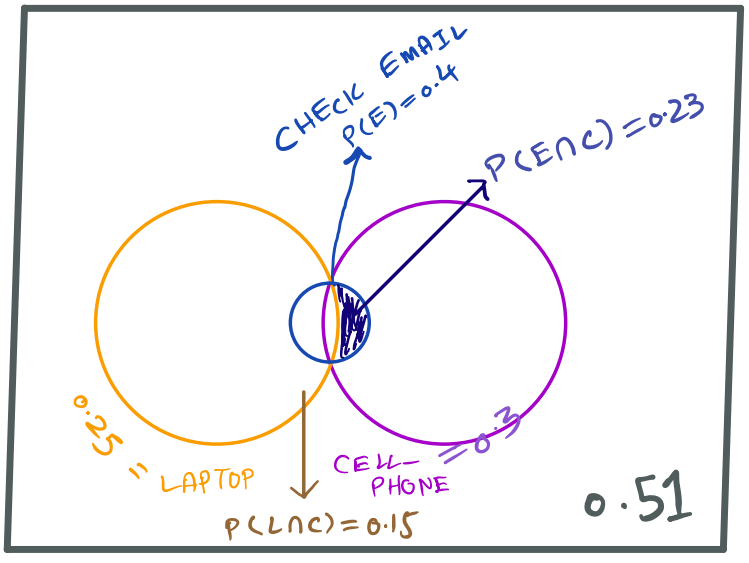
(b) $$P(AAA) + P(BBB) + P(CCC) = \frac{(4 \times 3 \times 2) + (5 \times 4 \times 3) + (6 \times 5 \times 4)}{15 \times 14 \times 13}$$

$$= \frac{24 + 60 + 120}{15 \times 14 \times 13}$$

$$= \frac{204}{2730} = \frac{34}{455}$$

(c) $P = {}^{3}P_{3} \times \frac{4 \times 5 \times 6}{15 \times 14 \times 13} = 6 \times \frac{4}{7 \times 13} = \frac{24}{91}$

QUESTION 4



$P(E) = 0.4$

$P(L) = 0.25$

$P(E|L) = 0.88$

$P(L|C) = 0.70$

(a) $P(C|E) = \frac{P(C \cap E)}{P(E)}$

$= \frac{0.23}{0.4}$

$= 23/40$

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

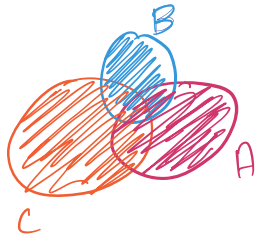
$= \frac{0.15}{0.25} = 3/5$

$P(C \cup L) = P(C) + P(L) - P(C \cap L)$

$P(C \cap L) = 0.3 + 0.25 - 0.4$

$= 0.15$

(c) $P(C \mid E \cap L) = \dfrac{P(C \cap E \cap L)}{P(E \cap L)}$



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

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

$\Rightarrow P(C \cap E \cap L) = \{P(C \cup E \cup L) + P(C \cap E) + P(E \cap L) + P(C \cap L)\} - \{P(C) + P(E) + P(L)\}$

$= \{(1 - 0.51) + 0.23 + 0.88(0.25) + 0.15\} - (0.3 + 0.4 + 0.25)$

$= 1.09 - 0.95$

$P(C \cap E \cap L) = 0.14$

$P(C \mid E \cap L) = \dfrac{0.14}{0.88(0.25)} = \dfrac{0.14}{0.22}$

$P(C \mid E \cap L) = 0.63$