6K #1. $P(A) = 0.4$ $\quad P(A \cap B) = 0.24$

$P(B) = 0.6$ $\quad P(B \cap C) = 0.15$

$P(C) = 0.3$ $\quad P(A \cup C) = 0.82$

$P(A) \cdot P(B) = 0.24 = P(A \cap B)$ A and B are indep.

$P(B) \cdot P(C) = 0.18 \neq P(B \cap C)$ ← B and C are not indep.

Independence

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

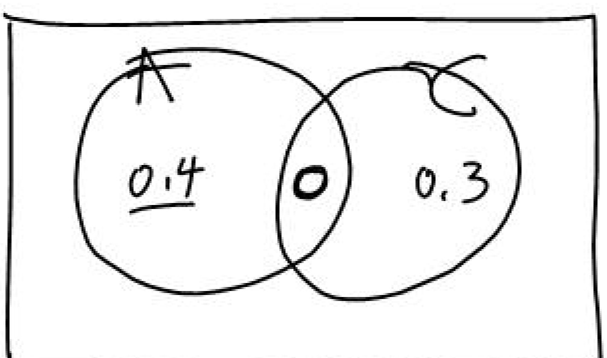
$P(A|B) = P(A)$

$P(B|A) = P(B)$

$\Big\} \quad \frac{P(A)}{\cancel{P(A|B)}} = \frac{P(A \cap B)}{P(B)}$ independent

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

$= 0.4 + 0.3 - 0.82 =$

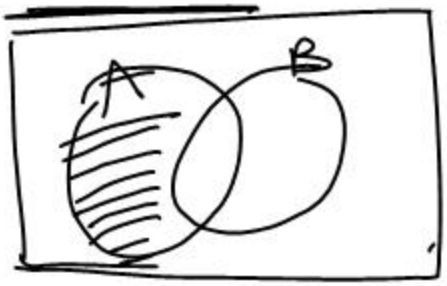


#3 $P(A|B) = P(A)$

$P(B|A) = P(B)$

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

(a) $P(A \cap B') = P(A) - P(A \cap B)$



$= P(A) - P(A) \cdot P(B)$

$= P(A)\left[1 - P(B)\right]$

$= P(A) \cdot P(B')$ A and B' are indep.

(b) $P(A' \cap B) = \ldots$

#4 $P(B|A) = \dfrac{P(B \cap A)}{P(A)} \Rightarrow P(B \cap A) = P(B|A) \cdot P(A)$

$= \dfrac{3}{4} \cdot \dfrac{1}{3}$

$= \dfrac{1}{4}$

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

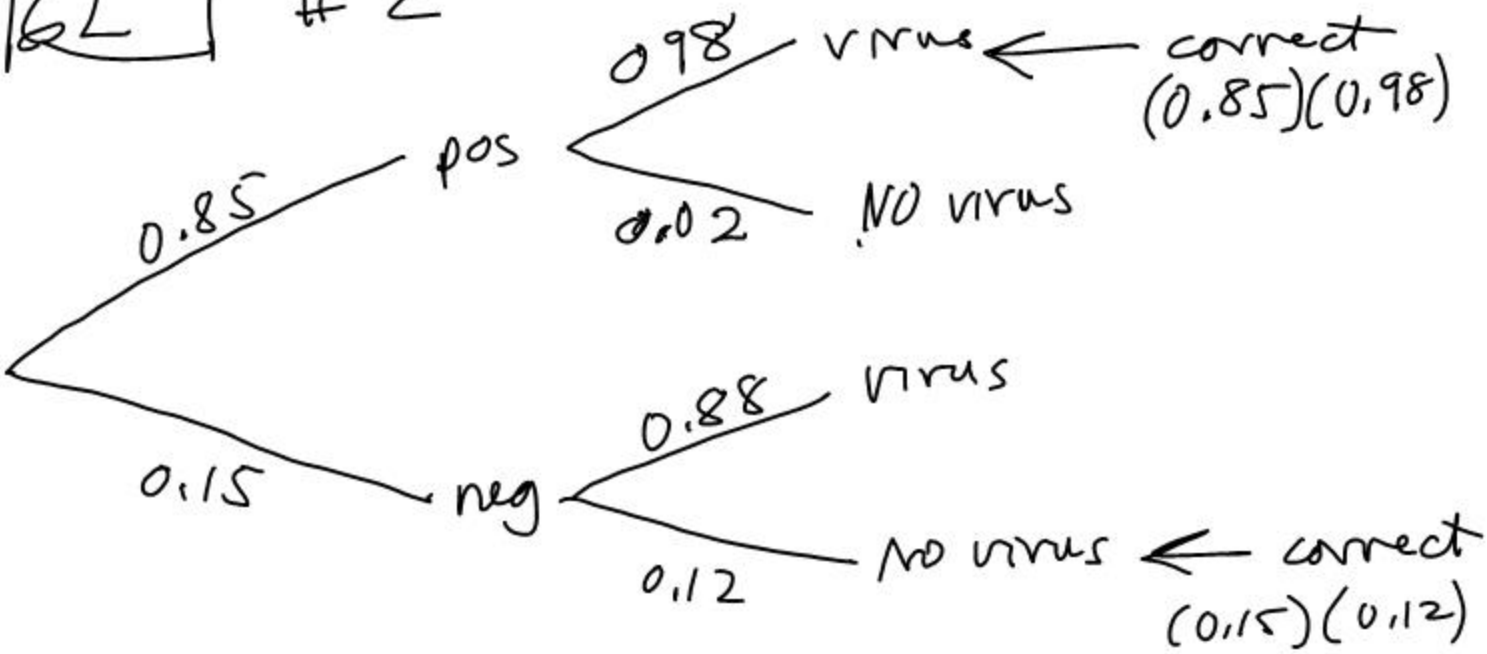
$\dfrac{5}{6} = \dfrac{1}{3} + P(B) - \dfrac{1}{4}$

$\dfrac{3}{4} = P(B)$

$P(B) = P(B|A)$

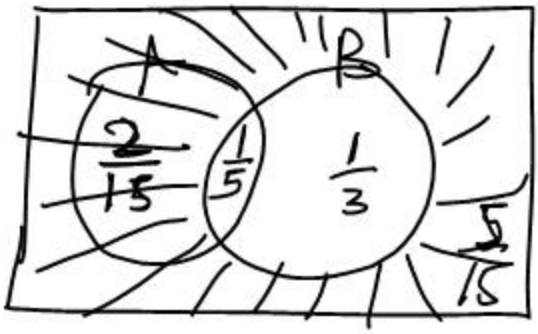
A and B are indep.

GL #2



$P(\text{correct}) = 0.851$

#4



$P(B') = 1 - \left(\frac{1}{5} + \frac{1}{3}\right) = \frac{7}{15}$

$P(B') = \frac{2}{15} + \frac{5}{15} = \frac{7}{15}$

$P(A' \cup B') = \frac{4}{5}$

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

$\frac{3}{5} = \frac{P(B \cap A)}{\frac{1}{3}}$

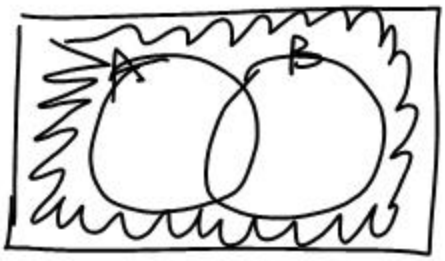
$P(B \cap A) = \frac{1}{5}$

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

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

$P(B \cap A') = \frac{1}{3}$

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



$P(A) = 0.2$
$P(A \cap B) = 0.1$
$P(A \cup B) = 0.5$

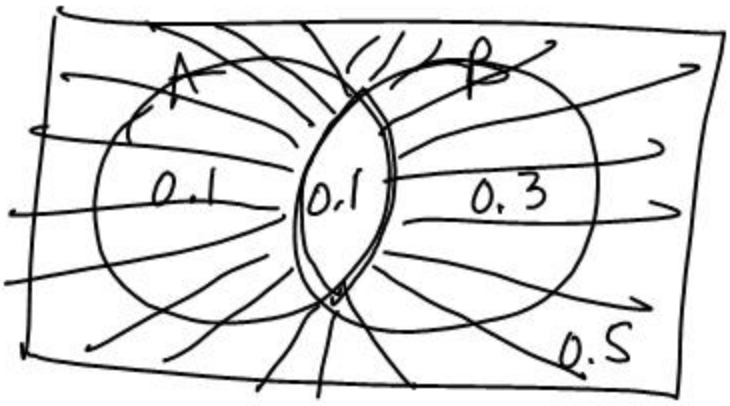
$P(A \cap B) = P(A) + P(B) - P(A \cup B)$

$0.1 = 0.2 + P(B) - 0.5$

$0.4 = P(B)$

$P(A \cap B)' = 1 - P(A \cap B) = 1 - 0.1 = 0.9$

$P(A \cup B)' = 1 - P(A \cup B)$



$= (A \cap B)'$

GL #6 (a) $\frac{1}{2} \cdot \frac{25}{51} \cdot \frac{24}{50}$

(b) $\frac{1}{4} \cdot \frac{12}{51} \cdot \frac{11}{50}$

(c) $\frac{12}{51} \cdot \frac{11}{50}$

(d) $\frac{4}{\binom{52}{3}}$

Bayes Theorem

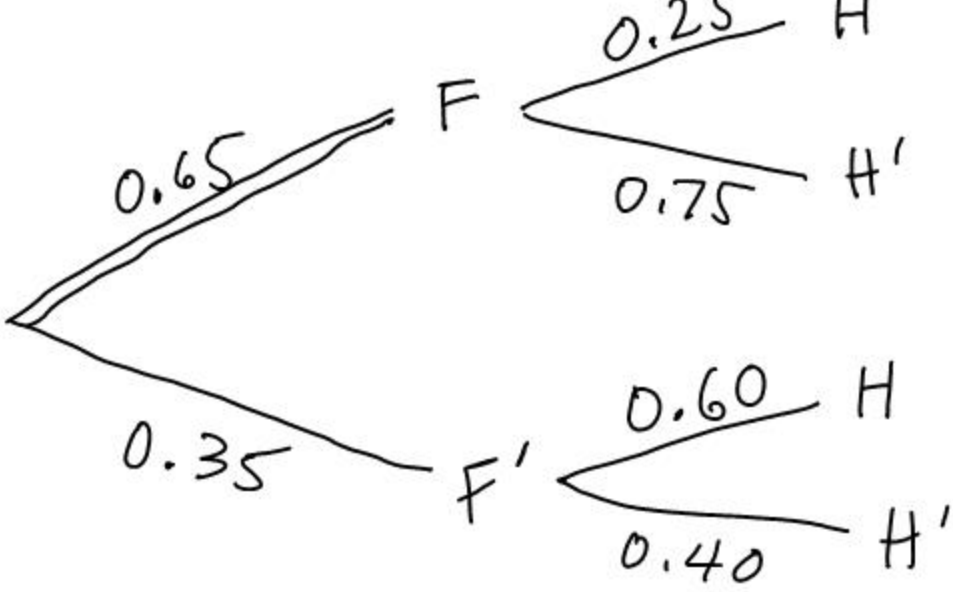
$$P(B|A) = \frac{P(B) \cdot P(A|B)}{P(B) \cdot P(A|B) + P(B') \cdot P(A|B')}$$

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

Ex. A school has 65% females and 25% of the females take HL Math. 60% of the males take HL Math. Choose a student at random. Find the prob of choosing a female given that the student takes HL Math.

F = female chosen
H = takes HL Math

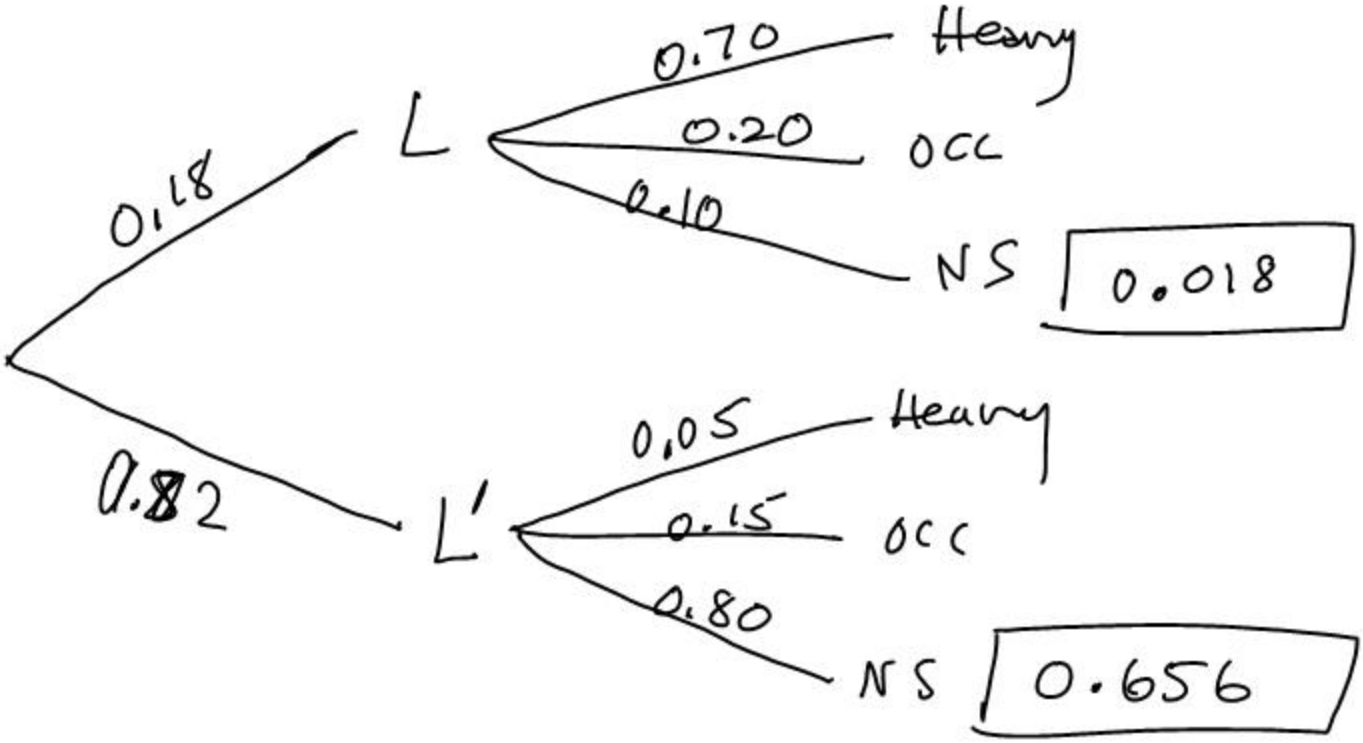
$\Big\rangle \; P(F \mid H)$



$$P(F|H) = \frac{P(F) \cdot P(H|F)}{P(F) \cdot P(H|F) + P(F') P(H|F')}$$

$$= \frac{(0.65)(0.25)}{(0.65)(0.25) + (0.35)(0.60)} = 0.436$$

6M #7 L = lung prob



(a) $P(NS) = 0.018 + 0.656 = 0.674$

(b) $P(L|HS) = \dfrac{P(L) \cdot P(HS|L)}{P(L) \cdot P(HS|L) + P(L') P(HS|L')}$

HW 6M # 8 - 10
