PAGE 12 : EXAMPLES (HANDOUT #2)

EXAMPLE 3 : $P(G) = 0.90$ $\quad P(G') = 0.10$

$P(D|G) = 0.01$ $\quad P(D|G') = 0.15$

(a). $P(D) = P(D \cap G) + P(D \cap G')$

$= P(D|G)P(G) + P(D|G')P(G')$

$= (0.01)(0.90) + (0.15)(0.10) = 0.024.$

(b). $P(G'|D) = \dfrac{P(D \cap G')}{P(D)} = \dfrac{(0.15)(0.10)}{0.024} = 0.625.$

EXAMPLE 4 : $P(SU) = 0.40$ $\quad P(SU') = 0.60$

$P(F|SU) = 0.80$ $\quad P(F|SU') = 0.30$

(a) $P(F) = P(F \cap SU) + P(F \cap SU')$

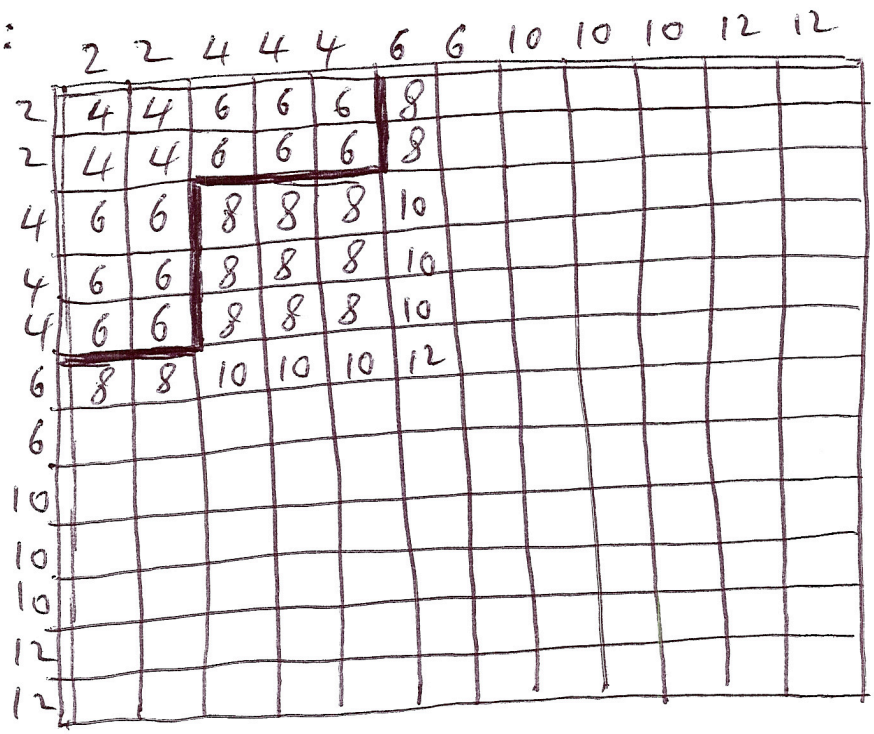
$= P(F|SU)P(SU) + P(F|SU')P(SU')$

$= (0.80)(0.40) + (0.30)(0.60) = 0.50.$

(b). $P(SU|F) = \dfrac{P(F \cap SU)}{P(F)} = \dfrac{(0.80)(0.40)}{0.50} = 0.64.$

PAGE 15 : PROBABILITY EXAMPLES (HANDOUT #2)

EXAMPLE 11 :



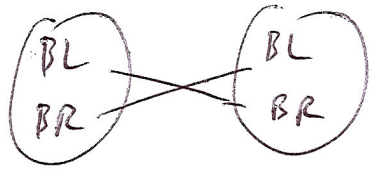
(a). $P(\text{sum} > 6) = 1 - P(\text{sum} \leq 6) = 1 - \frac{16}{144} = \frac{128}{144} = 0.89.$

(b) $A\,B'\,C'\,D'$
$A'\,B\,C'\,D'$
$A'\,B'\,C\,D'$
$A'\,B'\,C'\,D$

$\binom{4}{1} 0.89^{1} 0.11^{3} = 0.0047.$

EXAMPLE 11 :

(a).

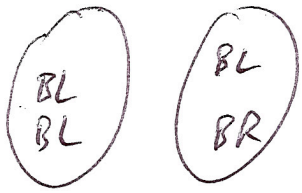


BL, BL
BL, BR
BR, BL
BR, BR

$$P\left[\begin{array}{l}\text{A HAS ONE}\\ \text{BLUE-EYED GENE}\end{array} \middle| \begin{array}{l}\text{A HAS}\\ \text{BROWN EYES}\end{array}\right] = \frac{\frac{1}{2}\frac{1}{2} + \frac{1}{2}\frac{1}{2}}{\frac{1}{2}\frac{1}{2} + \frac{1}{2}\frac{1}{2} + \frac{1}{2}\frac{1}{2}} = \frac{2}{3}.$$

(b). ~~C~~ = {CHILD HAS BLUE EYES}

~~A~~ = {A HAS ONE BLUE-EYED GENE}



$$P(C \cap A) = P(C|A) \cdot P(A)$$

$$= \left(\frac{1}{2}\frac{1}{2} + \frac{1}{2}\frac{1}{2}\right)\frac{2}{3} = \frac{1}{3}.$$

EXAMPLE 13 :

IT IS GIVEN : $P(D) = 0.60$ $\quad P(D') = 0.40$

$P(E|D) = 1$ $\quad P(E|D') = 0.30$

(a). $P(E) = P(E \cap D) + P(E \cap D')$

$= P(E|D)P(D) + P(E|D')P(D')$

$= 1\,(0.60) + (0.30)(0.40)$

$\Rightarrow P(E) = 0.72$

(b). $P(D|E) = \dfrac{P(E \cap D)}{P(E)} = \dfrac{P(E|D)P(D)}{P(E)}$

$= \dfrac{1\,(0.60)}{0.72} = 0.83.$

YES, SINCE PROB. $> 80\%$.