11. (*a*) A' (*b*) $A \cap B$ (*c*) $B \cap A'$ (*d*) $(A \cup B \cup C)'$ (*e*) $A \cup B$ (*f*) $A \cap C \cap B'$

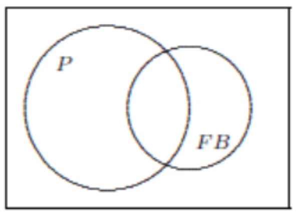
12. The student assumed he was defining a classical probability space, i.e., all the outcomes were equally likely but $P(H) = \frac{1}{2}$ and $P(TH) = \frac{1}{4}$. So the classical method is not applicable. $\{HH, HT, TH, TT\}$ is the classical space required. Then $P(\text{at least one } H) = \frac{n(H)}{n(S)} = \frac{3}{4}$.

14. (*a*) $P(D \cup St) = P(D) + P(St) - P(D \cap St) = 0.4 + 0.7 - 0.2 = 0.9$. So $P(D' \cap St') = 1 - P(D \cup St) = 1 - 0.9 = 0.1$.

(*b*) $P(St|D) = \dfrac{P(St \cap D)}{P(D)} = \dfrac{0.2}{0.4} = 0.5$.

(*c*) Symptoms are independent if and only if $P(D \cap St) = P(D) \cdot P(St)$. Here $0.2 \neq (0.4)(0.7) = 0.28$, so they are not independent.

16. (*a*)



$P(P) = 0.60 \qquad P(P') = P(W) = 0.40$

$P(FB) = 0.30 \quad P(FB') = P(NFB) = 0.70$

$P(P \cap FB) = 0.10$

(*b*) $P(W \cap FB) = P(FB) - P(P \cap FB) = 0.30 - 0.10 = 0.20$.

(*c*) $P(FB|W) = \frac{P(FB \cap W)}{P(W)} = \frac{0.20}{0.40} = 0.50$.

(*d*) $P(FB|P) = \frac{P(FB \cap P)}{P(P)} = \frac{0.10}{0.60} = 0.17$.

(*e*) Not independent; $P(FB|P) \neq P(FB)$ since $0.17 \neq 0.30$.

(*f*) Only 17% of the pink-flowered trees are infected, while 50% of the white-flowered trees are. Pink-flowered trees appear to be more resistant to fire blight. Recommend buying them.

18. (*a*) $P(M) = 0.80$, $P(T) = 0.30$, and $P(M \cap T) = 0.20$. So $P(M \cup T) = P(M) + P(T) - P(M \cap T) = 0.80 + 0.30 - 0.20 = 0.90$.

(*b*) $P(T'|M) = \frac{P(T' \cap M)}{P(M)} = \frac{0.60}{0.80} = 0.75$. (Note: $P(T' \cap M) = P(M) - P(M \cap T) = 0.80 - 0.20 = 0.60$.)

(*c*) Not independent because $P(M \cap T) \neq P(M) \times P(T)$.

25. (*a*) Since

$$P(\text{NIDD}|\text{obese}) = \frac{P(\text{NIDD} \cap \text{obese})}{P(\text{obese})}$$

then

$$0.07 = \frac{P(\text{NIDD} \cap \text{obese})}{0.30},$$

so $P(\text{NIDD} \cap \text{obese}) = 0.07 \times 0.30 = 0.021$.

(*b*) Since

$$P(\text{obese}|\text{NIDD}) = \frac{P(\text{obese} \cap \text{NIDD})}{P(\text{NIDD})}$$

then

$$0.90 = \frac{0.21}{P(\text{NIDD})},$$

so $P(\text{NIDD}) = \frac{0.021}{0.90} = 0.02\overline{3}$.