11. $P(E\cup F)=P(E)+P(F)-P(E\cap F)$

$$P(E\cap F)=P(E)+P(F)-P(E\cup F)$$
$$= 0.7+0.5-0.8$$
$$= 0.4$$

14. $P(E)=P(E\cup F)+P(E\cap F)-P(F)$

$$= 0.7+0.4-0.5$$
$$= 0.6$$

18. $P(A) = 0.7$, $P(B) = 0.4$ and $P(A \cap B) = 0.2$

(a) $P(A \text{ or } B) = P(A)+P(B)-P(A\cap B)$
$$= 0.7+0.4-0.2$$
$$= 0.9$$

(b) $P(A \text{ but not } B) = P(A)-P(A\cap B)$
$$= 0.7-0.2$$
$$= 0.5$$

(c) $P(B \text{ but not } A) = P(B)-P(A\cap B)$
$$= 0.4-0.2$$
$$= 0.2$$

(d) $P(\text{neither } A \text{ nor } B) = P(\overline{A\cup B})$
$$= 1-P(A\cup B)$$
$$= 1-0.9$$
$$= 0.1$$

22. $P(E)=\dfrac{1}{1+4}=\dfrac{1}{5}$

26. $P(E)=\dfrac{50}{50+1}=\dfrac{50}{51}$

29. $P(F) = \dfrac{3}{4}$ $\qquad P(\overline{F})=1-P(F)=\dfrac{1}{4}$

Odds for F: $\dfrac{P(F)}{P(\overline{F})}=\dfrac{\frac{3}{4}}{\frac{1}{4}}=\dfrac{3}{1}$ or 3 to 1

Odds against F: $\dfrac{P(\overline{F})}{P(F)}=\dfrac{\frac{1}{4}}{\frac{3}{4}}=\dfrac{1}{3}$ or 1 to 3

30. $P(G) = 0.1$ $\qquad P(\overline{G})=1-P(G)=0.9$

Odds for G: $\dfrac{P(G)}{P(\overline{G})}=\dfrac{1}{9}$ or 1 to 9

Odds against G: $\dfrac{P(\overline{G})}{P(G)}=\dfrac{9}{1}$ or 9 to 1

33. Let M and E be the events Anne passes mathematics and Anne passes English respectively. We are given $P(M) = 0.4$; $P(E) = 0.6$, and $P(M \cup E) = 0.8$. The probability that Anne passes both courses is

$$P(M\cap E) = P(M) + P(E) - P(M\cup E)$$
$$= 0.4 + 0.6 - 0.8$$
$$= 0.2$$

34. Let M and E be the events Anne passes mathematics and Anne passes English respectively. When $P(M) = 0.7$; $P(M \cup E) = 0.8$; and $P(M \cap E) = 0.1$,

$$P(E) = P(M\cup E) - P(M) + P(M\cap E)$$
$$= 0.8 - 0.7 + 0.1$$
$$= 0.2$$

36. $P(E\cup F) = P(E) + P(F) - P(E\cap F)$
$$= 0.06 + 0.04 - 0.02$$
$$= 0.08$$