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As suggested by the book, we can consider that

$$E = (E \cap F) \cup (E \cap \overline{F}).$$

Consequently

$$p(E) = p((E \cap F) \cup (E \cap \overline{F})).$$

F and $\overline{F}$ are distinct events, then $E \cap F$ and $E \cap \overline{F}$ are distint also. Consequently the probability of their union is the sum of the single probabilities:

$$p(E) = p(E \cap F) + p(E \cap \overline{F}). \tag{1}$$

We also know, from the definition of conditional probability, that for any pair of events A and B,

$$p(A \cap B) = p(A|B)\ p(B).$$

Applying this formula to (1), we finally obtain

$$p(E) = p(E|F)\ p(F) + p(E|\overline{F})\ p(\overline{F}).$$