6. $P(\overline{E} \mid A) = 0.6$

8. $P(\overline{E} \mid B) = 0.8$

10. $P(\overline{E} \mid C) = 0.3$

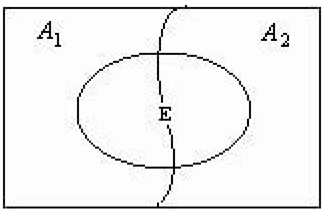
12. $P(\overline{E}) = 1 - P(E) = 1 - 0.31 = 0.69$

14. $$P(B \mid \overline{E}) = \frac{P\left(B \cap \overline{E}\right)}{P\left(\overline{E}\right)} = \frac{P\left(\overline{E} \mid B\right) \cdot P(B)}{P\left(\overline{E}\right)} = \frac{(0.8)(0.6)}{0.69} = \frac{48}{69} = 0.696$$

16. $$P(A \mid \overline{E}) = \frac{P\left(A \cap \overline{E}\right)}{P\left(\overline{E}\right)} = \frac{P\left(\overline{E} \mid A\right) \cdot P(A)}{P\left(\overline{E}\right)} = \frac{(0.6)(0.3)}{0.69} = \frac{18}{69} = 0.261$$

18. $$P(C \mid \overline{E}) = \frac{P\left(C \cap \overline{E}\right)}{P\left(\overline{E}\right)} = \frac{P\left(\overline{E} \mid C\right) \cdot P(C)}{P\left(\overline{E}\right)} = \frac{(0.3)(0.1)}{0.69} = \frac{3}{69} = 0.043$$

19.



$$\begin{aligned} P(E) &= P(E \cap A_1) + P(E \cap A_2) \\ &= P(A_1) \cdot P(E \mid A_1) + P(A_2) \cdot P(E \mid A_2) \\ &= (0.4) \cdot (0.03) + (0.6) \cdot (0.02) \\ &= 0.024 \end{aligned}$$

22. $$\begin{aligned} P(E) &= P(E \cap A_1) + P(E \cap A_2) + P(E \cap A_3) \\ &= P(A_1) \cdot P(E \mid A_1) + P(A_2) \cdot P(E \mid A_2) + P(A_3) \cdot P(E \mid A_3) \\ &= (0.3) \cdot (0.01) + (0.2) \cdot (0.02) + (0.5) \cdot (0.02) \\ &= 0.017 \end{aligned}$$

23. $$P(A_1 \mid E) = \frac{P(A_1 \cap E)}{P(E)} = \frac{P(A_1) \cdot P(E \mid A_1)}{P(E)} = \frac{(0.4)(0.03)}{0.024} = \frac{12}{24} = \frac{1}{2} = 0.5$$

$$P(A_2 \mid E) = \frac{P(A_2 \cap E)}{P(E)} = \frac{P(A_2) \cdot P(E \mid A_2)}{P(E)} = \frac{(0.6)(0.02)}{0.024} = \frac{12}{24} = \frac{1}{2} = 0.5$$

26. $P(A_1 \mid E) = \dfrac{P(A_1 \cap E)}{P(E)} = \dfrac{P(A_1)\cdot P(E \mid A_1)}{P(E)} = \dfrac{(0.3)(0.01)}{0.017} = \dfrac{3}{17} = 0.176$

$P(A_2 \mid E) = \dfrac{P(A_2 \cap E)}{P(E)} = \dfrac{P(A_2)\cdot P(E \mid A_2)}{P(E)} = \dfrac{(0.2)(0.02)}{0.017} = \dfrac{4}{17} = 0.235$

$P(A_3 \mid E) = \dfrac{P(A_3 \cap E)}{P(E)} = \dfrac{P(A_3)\cdot P(E \mid A_3)}{P(E)} = \dfrac{(0.5)(0.02)}{0.017} = \dfrac{10}{17} = 0.588$

28. Define the events: A_1: Car was produced in factory I, A_2: Car was produced in factory II, and E: a car is defective.

$$P(A_1) = \frac{2}{3} \qquad P(A_2) = \frac{1}{3} \qquad P(E \mid A_1) = 0.02 \qquad P(E \mid A_2) = 0.01$$

(a) $P(E \mid A_1) = 0.02$

(b) $P(E \mid A_2) = 0.01$

(c) $P(A_1 \mid E) = \dfrac{P(A_1 \cap E)}{P(E)} = \dfrac{P(A_1)\cdot P(E \mid A_1)}{P(E)}$

We need to find $P(E)$.

$$\begin{aligned} P(E) &= P(E \cap A_1) + P(E \cap A_2) \\ &= P(A_1)\cdot P(E \mid A_1) + P(A_2)\cdot P(E \mid A_2) \\ &= \left(\frac{2}{3}\right)\cdot(0.02) + \left(\frac{1}{3}\right)\cdot(0.01) = \frac{5}{300} = \frac{1}{60} = 0.0167 \end{aligned}$$

$$P(A_1 \mid E) = \frac{P(A_1 \cap E)}{P(E)} = \frac{P(A_1)\cdot P(E \mid A_1)}{P(E)} = \frac{\left(\frac{2}{3}\right)(0.02)}{\frac{1}{60}} = \frac{4}{5} = 0.8$$

(d) $P(A_2 \mid E) = \dfrac{P(A_2 \cap E)}{P(E)} = \dfrac{P(A_2)\cdot P(E \mid A_2)}{P(E)} = \dfrac{\frac{1}{3}\cdot(0.01)}{\frac{1}{60}} = \dfrac{1}{5} = 0.20$

32. Define the events A: a Kave customer has seen the ad, M: a customer is male, F: a customer is female.

$$P(M) = 0.8 \quad P(F) = 0.2 \quad P(A \mid M) = 0.75 \quad P(A \mid F) = 0.30$$

(a) $P(A) = P(A \cap M) + P(A \cap F) = P(M) \cdot P(A \mid M) + P(F) \cdot P(A \mid F)$

$$= 0.8 \cdot 0.75 + 0.2 \cdot 0.3 = 0.66$$

(b) $P(F \mid A) = \dfrac{P(F \cap A)}{P(A)} = \dfrac{P(F) \cdot P(A \mid F)}{P(A)} = \dfrac{0.2 \cdot 0.3}{0.66} = \dfrac{1}{11} \approx 0.091$

(c) We need the probability the customer has not seen the ad. We need $\overline{A}$.

$$P(\overline{A}) = 1 - P(A) = 1 - 0.66 = 0.34 \quad P(\overline{A} \mid M) = 1 - P(A \mid M) = 1 - 0.75 = 0.25$$

$$P(M \mid \overline{A}) = \frac{P(M \cap \overline{A})}{P(\overline{A})} = \frac{P(M) \cdot P(\overline{A} \mid M)}{P(\overline{A})} = \frac{0.8 \cdot 0.25}{0.34} = \frac{10}{17} \approx 0.588$$