Homework 2 Solution

Problem 23

$$p(\text{other side is also red} \mid \text{side facing up is red}) = \frac{p(\text{both sides red})}{p(\text{side facing up is red})} = \frac{1/3}{3/6} = 1/2$$

Problem 26

a

$$p(H < 25,000) = \frac{248}{500}$$

b

$$p(W > 25,000 \mid \text{H} > 25,000) = \frac{p(W > 25,000 and H > 25,000)}{p(H > 25,000)} = \frac{54}{252}$$

Problem 27

p(A) = p(B)= 1/2

$$p(\text{other one is defective} \mid \text{first radio is defective}) = \frac{p(\text{both defective}}{p(\text{first radio is defective})}$$

$$= \frac{\frac{1}{2}0.05^2 + \frac{1}{2}0.01^2}{\frac{1}{2}0.05 + \frac{1}{2}0.01}$$

Problem 29

a

$$p(\text{plant alive}) = (0.85)(0.9) + (0.2)(0.1)$$

b

$$p(\text{no water} \mid \text{dead plant}) = \frac{(0.1)(0.8)}{(0.9)(0.15) + (0.1)(0.8)}$$

Problem 30

a

$$\begin{aligned} &p(\text{both balls are red} \mid \text{first two chosen are red}) \\ &= \frac{p(\text{both red})}{p(\text{first two chosen are red})} \\ &= \frac{0.25}{p(\text{first 2 red} \mid \text{RR}).p(RR) + p(\text{first 2 red} \mid \text{RB}).p(RB)} \\ &= \frac{0.25}{1(0.25) + (0.25)(0.5)} = \frac{1/4}{3/8} = \frac{2}{3} \end{aligned}$$

b

$$\begin{aligned} &p(\text{next ball chosen is red} \mid \text{first 2 chosen are red}) \\ &= \frac{p(\text{first 3 are red})}{p(\text{first 2 are red})} \\ &= \frac{p(\text{first 3 red} \mid \text{RR}).p(RR) + p(\text{first 3 red} \mid \text{R B}).p(RB)}{p(\text{first 2 red})} \\ &= \frac{(1/4) + (1/8)(1/2)}{3/8} = \frac{5}{6} \end{aligned}$$

Problem 31

$$P(\text{person is a Democrat} \mid \text{voted for Republican}) = \frac{50}{590}$$

Problem 33

$$\begin{aligned} &p(\text{other drawer contains a silver coin} \mid \text{first drawer contains a silver coin}) \\ &= \frac{p(\text{both silver})}{p(\text{first drawer contains a silver coin})} \\ &= \frac{p(ss)}{p(s \mid A).p(A) + p(s \mid B).p(B)} \\ &= \frac{0.5}{0.5 + (0.25)(0.25)} \end{aligned}$$

Problem 39

a

$$p(\text{first 3 flips are same}) = p(\text{HHH or TTT}) = (1/8) + (1/8) = 1/4$$

b

$$p(\text{first 3 flips are the same or the last 3 flips are the same}) = (1/4)+(1/4)-(2/32)$$

c 6/32