Statistics 430
HW #2 Solutions

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1 Ch 3 Problem 1

Denote the event "at least one 6" by 6^+, and the event "the rolls are different by D. Then

$$\begin{aligned} P(6^+|D) &= \frac{P(6^+|D)}{P(D)} \\ &= \frac{10/36}{30/36} \\ &= \boxed{\frac{1}{3}} \end{aligned}$$

2 Ch 3 Problem 5

The desired probability is given by

$$\frac{6*5*9*8}{15*14*13*12} = \boxed{\frac{6}{91} = .0659}$$

An alternative expression is $\frac{\binom{6}{2}\binom{9}{2}}{\binom{15}{2}\binom{13}{2}}$.

3 Ch 3 Problem 9

$$\frac{2*8*3+2*4*1}{2*8*3+2*4*1+4*8*1} = \boxed{\frac{7}{11} = .636}$$

4 Ch 3 Problem 17

We are given that $P(D) = .36$, $P(C|D) = .22$, and $P(C) = .3$

a

$P(D \cap C) = P(C|D)P(D) = .36 \times .22 = \boxed{.0792}$

b

$P(D|C) = \frac{P(C|D)P(D)}{P(C)} = \frac{.36 \times .22}{.3} = \boxed{.264}$

5 Ch 3 Problem 20

We are given that $P(F) = .52$, $P(CS) = .05$, and $P(CS \cap F) = .02$

a

$P(F|CS) = \frac{P(F \cap CS)}{P(CS)} = \frac{.02}{.05} = \boxed{.4}$

5.1 b

$P(CS|F) = \frac{P(F|CS)P(CS)}{P(F)} = \frac{.4 \times .05}{.52} = \boxed{\frac{1}{26} = .038}$

6 Ch 3 Problem 38

$$\begin{aligned} P(T|W) &= \frac{P(W|T)P(T)}{P(W|T)P(T) + P(W|H)P(H)} \\ &= \frac{\frac{3}{15} \times \frac{1}{2}}{\frac{3}{15} \times \frac{1}{2} + \frac{5}{12} \times \frac{1}{2}} \\ &= \boxed{\frac{12}{37} = .324} \end{aligned}$$

7 Ch 3 Problem 43

$P(H|C_1) = 1$

$P(H|C_2) = \frac{1}{2}$

$P(H|C_3) = \frac{3}{4}$

$$\begin{aligned} P(C_1|H) &= \frac{P(H|C_1)P(C_1)}{P(H|C_1)P(C_1) + P(H|C_2)P(C_2) + P(H|C_3)P(C_3)} \\ &= \frac{1 \times \frac{1}{3}}{1 \times \frac{1}{3} + \frac{1}{2} \times \frac{1}{3} + \frac{3}{4} \times \frac{1}{3}} \\ &= \boxed{\frac{4}{9}} \end{aligned}$$