

1.3.2

You roll two fair six-sided dice; one die is red, the other is white. Let R_i be the event that the red die rolls i . Let W_j be the event that the white die rolls j .

(a) what is $P(R_3 W_2)$

$$S_R = \{1, 2, 3, 4, 5, 6\}$$

$$S_W = \{1, 2, 3, 4, 5, 6\}$$

$$P(R_3) = 1/6$$

$$P(S_W) = 1/6$$

$$P(R_3 W_2) = P(R_3) P(W_2) = \frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$$

(b) What is the $P(S'_5)$ that the sum of the two rolls is 5?

$$P(R_1 W_4) \text{ OR } P(R_2 W_3) \text{ OR } P(R_3 W_2) \text{ OR } P(R_4 W_1)$$

$$P(R_1 W_4) \cup P(R_2 W_3) \cup P(R_3 W_2) \cup P(R_4 W_1)$$

$$P(R_1 W_4) + P(R_2 W_3) + P(R_3 W_2) + P(R_4 W_1)$$

$$\frac{1}{36} + \frac{1}{36} + \frac{1}{36} + \frac{1}{36} = \frac{4}{36}$$

$$P(S'_5) = \frac{4}{36} = \frac{1}{9}$$

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Homework 01

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1.4) Mobile telephones perform handoffs as they move from cell to cell. During a call, a telephone either performs zero handoffs (H_0), one handoff (H_1), or more than one handoff (H_2). In addition, each call is either long (L), if it lasts more than three minutes, or brief (B). The following table describes the probabilities of the possible types of calls.

	H_0	H_1	H_2
L	0.1	0.1	0.2
B	0.4	0.1	0.1

(a) what is the probability that a brief call will have no handoffs?

$$P(H_0|B) = \frac{P(H_0 \cap B)}{P(B)} = \frac{0.4}{0.6} = \frac{2}{3}$$

(b) what is the probability that a call with one handoff will be long?

$$P(L|H_1) = \frac{P(L \cap H_1)}{P(H_1)} = \frac{0.1}{0.2} = \frac{1}{2}$$

(c) what is the probability that a long call will have one or more handoffs?

$$P(H_1 \cup H_2 | L) = \frac{P(H_1 \cap L) + P(H_2 \cap L)}{P(L)} = \frac{0.1 + 0.2}{0.4} = \frac{3}{4}$$

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Homework 01

1.5.1 Given the model of handoffs and call lengths in Problem 1.4.1

(a) what is the probability $P(H_0)$ that a phone makes no handoffs?

$$P(H_0) = P(H_0L) + P(H_0B) = 0.1 + 0.4 = 0.5$$

(b) what is the probability that a call ~~with~~ ~~one hand off~~ ~~will be long?~~ is brief?

$$\begin{aligned} P(B) &= P(BH_0) + P(BH_1) + P(BH_2) \\ &= 0.4 + 0.1 + 0.1 = 0.6 \end{aligned}$$

(c) what is the probability a call is long or there are at least two handoffs?

$$\begin{aligned} P(L \cup H_2) &= P(LH_0) + P(LH_1) + P(LH_2) + P(BH_2) \\ &= 0.1 + 0.1 + 0.2 + 0.1 \\ &= 0.5 \end{aligned}$$

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Homework 01

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