

2. If we need to check whether the first resistance exceeds the second resistance, an event space is

$$B_1 = \{R_1 > R_2\} \quad B_2 = \{R_1 \leq R_2\}. \quad (2)$$

3. If we need to check whether each resistance doesn't fall below a minimum value (in this case 50 ohms for R_1 and 100 ohms for R_2), an event space is

$$C_1 = \{R_1 < 50, R_2 < 100\}, \quad C_2 = \{R_1 < 50, R_2 \geq 100\}, \quad (3)$$

$$C_3 = \{R_1 \geq 50, R_2 < 100\}, \quad C_4 = \{R_1 \geq 50, R_2 \geq 100\}. \quad (4)$$

4. If we want to check whether the resistors in parallel are within an acceptable range of 90 to 110 ohms, an event space is

$$D_1 = \{(1/R_1 + 1/R_2)^{-1} < 90\}, \quad (5)$$

$$D_2 = \{90 \leq (1/R_1 + 1/R_2)^{-1} \leq 110\}, \quad (6)$$

$$D_3 = \{(1/R_1 + 1/R_2)^{-1} > 110\}. \quad (7)$$

Problem 1.3.1 Solution

The sample space of the experiment is

$$S = \{LF, BF, LW, BW\}. \quad (1)$$

From the problem statement, we know that $P[LF] = 0.5$, $P[BF] = 0.2$ and $P[BW] = 0.2$. This implies $P[LW] = 1 - 0.5 - 0.2 - 0.2 = 0.1$. The questions can be answered using Theorem 1.5.

- (a) The probability that a program is slow is

$$P[W] = P[LW] + P[BW] = 0.1 + 0.2 = 0.3. \quad (2)$$

- (b) The probability that a program is big is

$$P[B] = P[BF] + P[BW] = 0.2 + 0.2 = 0.4. \quad (3)$$

- (c) The probability that a program is slow or big is

$$P[W \cup B] = P[W] + P[B] - P[BW] = 0.3 + 0.4 - 0.2 = 0.5. \quad (4)$$

Problem 1.3.2 Solution

A sample outcome indicates whether the cell phone is handheld (H) or mobile (M) and whether the speed is fast (F) or slow (W). The sample space is

$$S = \{HF, HW, MF, MW\}. \quad (1)$$

The problem statement tells us that $P[HF] = 0.2$, $P[MW] = 0.1$ and $P[F] = 0.5$. We can use these facts to find the probabilities of the other outcomes. In particular,

$$P[F] = P[HF] + P[MF]. \quad (2)$$

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