**Problem 8.41** Consider the random experiment of selecting a number uniformly distributed over the range {1, 2, 3, ..., 120}. Let A, B, and C be the events that the selected number is a multiple of 3, 4, and 6, respectively.

- a) What is the probability of event A, i.e. P[A]? b) What is P[B]? c) What is  $P[A \cap B]$ ? d) What is  $P[A \cup B]$ ?
- e) What is  $\mathbf{P}[A \cap C]$ ?

## **Solution**

(a) From a counting argument,  $\mathbf{P}(A) = \frac{40}{120} = \frac{1}{3}$ 

(b) 
$$\mathbf{P}(B) = \frac{30}{120} = \frac{1}{4}$$

(c) 
$$\mathbf{P}(A \cap B) = \frac{12}{120} = \frac{1}{10}$$

(d)

$$\mathbf{P}(A \cup B) = \mathbf{P}(A) + \mathbf{P}(B) - \mathbf{P}(A \cap B)$$
$$= \frac{1}{3} + \frac{1}{4} - \frac{1}{10} = \frac{20 + 15 - 6}{60} = \frac{29}{60}$$

(e) 
$$\mathbf{P}(A \cap C) = \mathbf{P}(C) = \frac{20}{120} = \frac{1}{6}$$

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