Les 07

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homework assignments

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Continue wiskunde en statistiek

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1   2.5.3

a. P(C) = P(A—B^c)

b. P(D) = $P(A \cup B|(A \cap B)^c)$

2   2.5.4

Given that (source: Elementary Probability for Applications, p13):

$$P(A) = P(A \cap B) + P(A \cap B^c) \tag{1}$$

$$P(B) = P(B \cap A) + P(B \cap A^c) \tag{2}$$

$$P(A)+P(B)-P(A\cap B) = P(A\cap B)+P(A\cap B^c)+P(B\cap A^c) = P(A\cup B) \tag{3}$$

From this we get

$$P(A \cap B) = -P(A \cup B) + P(A) + P(B) \tag{4}$$

$$P(A^c \cup B^c) = P((A \cap B)^c) \tag{5}$$

$$P(A^c \cap B) = P(B) - P(A \cap B) \tag{6}$$

Also given:

$P(A) = \frac{1}{3}, P(B) = \frac{1}{2}, P(A \cup B) = \frac{3}{4}$

$P(A^c) = \frac{2}{3}, P(B^c) = \frac{1}{2}, P((A \cup B)^c) = \frac{1}{4}$

a. $\frac{1}{3} + \frac{1}{2} - \frac{3}{4} = \frac{1}{12}$

b. $1 - \frac{1}{12} = \frac{11}{12}$

c. $\frac{1}{2} - \frac{1}{12} = \frac{5}{12}$

3   2.5.7

a. $P(K) = \frac{13}{52} = \frac{1}{4}$

b. $P(A|K) = \frac{4}{52} \cdot \frac{13}{52} = \frac{1}{52}$ which is intuitively correct, there is only one of it.

c. No, for no info we get $P(A) = \frac{4}{52}$, with info we see it as $P(A) = \frac{1}{13}$.

4   2.5.9

$P(C) = \frac{4}{5}$ (C = werkCollege)

$P(N) = \frac{1}{2}$ (N = no werkcollege)

$(A) = \frac{7}{10}$ (A = attendance)

a. $P(C|A) + P(N|A^c) = \frac{4}{5} \cdot \frac{7}{10} + \frac{1}{2} \cdot \frac{3}{10} = \frac{71}{100}$

b. I first write the above forumula as $a \cdot b + c \cdot d = e$

We want to know b, the attendance.

$b + \frac{c \cdot d}{a} = \frac{e}{a}$

$b = \frac{e}{a} - \frac{c \cdot d}{a}$

$$\frac{71}{100} / \frac{4}{5} - \left(\frac{1}{2} \cdot \frac{3}{10}\right) / \frac{4}{5} = \frac{71}{100} \cdot \frac{5}{4} - \frac{1}{2} \cdot \frac{3}{10} \cdot \frac{5}{4} = \left(\frac{71}{100} - \frac{1}{2} \cdot \frac{3}{10}\right) \cdot \frac{5}{4} = \frac{56}{100} \cdot \frac{5}{4} = \frac{45}{100} \quad (7)$$

5   Practicum 1

Zie .m file.