

Assignment

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Question 11.16.3.11

The accompanying venn diagram shows three events, A, B and C, and also the probabilities of the various intersections (for instance, $\Pr(AB) = 0.7$). Determine

- 1) $\Pr(A)$
- 2) $\Pr(BC')$
- 3) $\Pr(A + B)$
- 4) $\Pr(AB')$
- 5) $\Pr(BC)$
- 6) Probability of exactly one of the three occurs

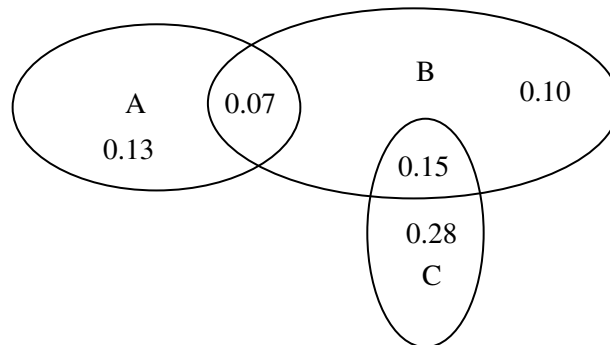


Fig. 1: generated by Latextikz

Solution:

1)

$$\Pr(A) = 0.13 + 0.07 \quad (1)$$

$$= 0.2 \quad (2)$$

2)

$$\Rightarrow B = B(C + C') \quad (3)$$

$$\Rightarrow \Pr(B) = \Pr(BC + BC') \quad (4)$$

$$= \Pr(BC) + \Pr(BC') - \Pr(BCC') \quad (5)$$

$$= \Pr(BC) + \Pr(BC') \quad (6)$$

$$\Pr(BC') = \Pr(B) - \Pr(BC) \quad (7)$$

$$= 0.07 + 0.10 + 0.15 - 0.15 \quad (8)$$

$$= 0.17 \quad (9)$$

3)

$$\Pr(A + B) = \Pr(A) + \Pr(B) - \Pr(AB) \quad (10)$$

$$= 0.20 + (0.07 + 0.10 + 0.15) - 0.07 \quad (11)$$

$$= -0.45 \quad (12)$$

4)

$$\implies A = A(B + B') \quad (13)$$

$$\implies \Pr(A) = \Pr(AB + AB') \quad (14)$$

$$= \Pr(AB) + \Pr(AB') - \Pr(ABB') \quad (15)$$

$$= \Pr(AB) + \Pr(AB') \quad (16)$$

$$\Pr(AB') = \Pr(A) - \Pr(AB) \quad (17)$$

$$= 0.20 - 0.07 \quad (18)$$

$$= 0.13 \quad (19)$$

5)

$$\Pr(BC) = 0.15 \quad (20)$$

6)

$$\Pr(\text{exactly one of the 3 occurs}) = 0.13 + 0.10 + 0.28 \quad (21)$$

$$= 0.51 \quad (22)$$