Assignment:- 2

AI1110: Probability and Random Variables
Indian Institute of Technology, Hyderabad

CS22BTECH11001
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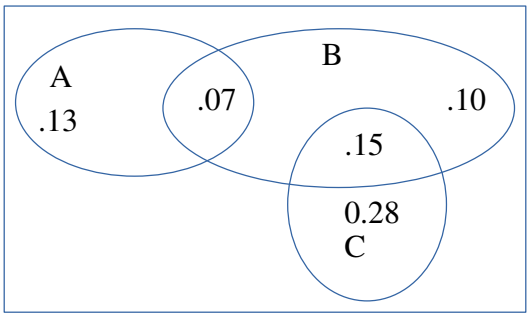
Exexplar 11.16.3.11 The accompanying Venn diagram shows three events, A, B, and C, and also the probabilities of the various intersections (for instance, $\Pr(AB) = .07$). Determine

(a) $\Pr(A)$
(b) $\Pr(BC')$
(c) $\Pr(A + B)$
(d) $\Pr(AB')$
(e) $\Pr(BC)$
(f) Probability of exactly one of the three occurs.



Solution.

(a) Clearly,

$$\Pr(A) = 0.13 + 0.07 \quad (1)$$
$$= 0.20 \quad (2)$$

(b) Clearly,

$$\Pr(B) = 0.10 + 0.07 + 0.15 \quad (3)$$
$$= 0.32 \quad (4)$$

Also,

$$\Pr(BC') = \Pr(B) - \Pr(BC) \quad (5)$$
$$= 0.32 - 0.15 \quad (6)$$
$$= 0.17 \quad (7)$$

(c) From Axioms of Probability

$$\Pr(A + B) = \Pr(A) + \Pr(B) - \Pr(AB) \quad (8)$$
$$= 0.20 + 0.32 - 0.07 \quad (9)$$
$$= 0.45 \quad (10)$$

(d)

$$\Pr(AB') = \Pr(A) - \Pr(AB) \quad (11)$$
$$= 0.20 - 0.07 \quad (12)$$
$$= 0.13 \quad (13)$$

(e) Clearly,

$$\Pr(BC) = 0.15 \quad (14)$$

(f) Let E be the event that exactly one of A, B or C occurs.

$$\Pr(E) = \Pr(AB'C') + \Pr(A'BC') + \Pr(A'B'C) \quad (15)$$
$$= 0.13 + 0.10 + 0.28 \quad (16)$$
$$= 0.51 \quad (17)$$