Independent events :-

$p(A \cap B) = p(A) \cdot p(B)$

$P(A) + P(B) - 2p(A \cup B) = p(A \cup B) - p(A \cap B)$

exactly one of A, B occurs.

$p(A \cap B) = p(A) \, p(B|A)$, if $p(A) \neq 0$

or

$p(A \cap B) = p(B) \cdot p(A|B)$, if $p(B) \neq 0$

* A, B independent events

then $p(A|B) = p(A)$, $p(B|A) = p(B)$

$p(A \cap B) = p(A) \, p(B)$

$p(A \cup B) = 1 - p(\bar{A}) \, p(\bar{B})$

* A, B, C 3 events

P(Atleast ~~one~~ two of A, B, C occur) $= p(A \cap B) + p(B \cap C) + p(C \cap A) - 2p(A \cap B \cap C)$

p(exactly two of A, B, C, occur) $= p(A \cap B) + p(B \cap C) + p(C \cap A) - 3p(A \cap B \cap C)$

p(exactly one occur) $= p(A) + p(B) + p(C) - 2p(A \cap B) - 2p(B \cap C) - 2p(A \cap C) + 3p(A \cap B \cap C)$

A, B, C mutually exclusive

$\therefore p(A \cap B) = p(B \cap C) = p(C \cap A) = 0 = p(A \cap B \cap C)$

$\therefore p(A \cup B \cup C) = p(A) + p(B) + p(C)$

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