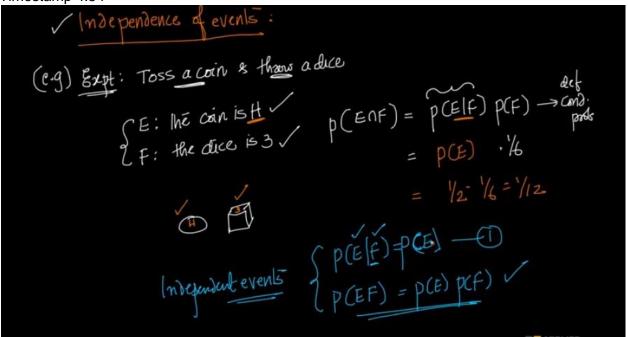
21.8 Independent events

Timestamp 4.54



 Consider an experiment of tossing a coin and throwing a dice. As shown above define two events E and F

E = Probability of getting heads

F = Probability of getting 3

2. The probability of both events happening E∩F can be obtained using conditional probability.

$$p(E \cap F) = p(E/F)$$
. $p(F)$

3. The fact that F has already happened has no impact on E happening. Event E happening doesn't depend on event F (E is independent if F), so p(E/F) = p(E). Then

$$p(E \cap F) = p(E)$$
. $p(F)$

4. Two events are said to be independent events when their intersection is equal to the product of the product of events.

Timestamp 11.53

NOTE: Independence vs Mutually Exclusive
$$\begin{array}{c|c}
\hline
& P(E \cap F) = p(E) p(F) \\
\hline
& P(E \cap F) = p(E) \\
\hline
& P(E \cap F) = P(E)
\end{array}$$

$$\begin{array}{c|c}
\hline
& P(E \cap F) = P(E) \\
\hline
& P(E \cap F) = P(E)
\end{array}$$

• For mutually exclusive events the intersection of events is null, independent events when their intersection is equal to the product of the product of events.

 In the above example probability of picking a second card doesn't depend on the event of picking the first card since we are replacing the first card. They both are independent events.

(e.g) (2) Coins (distinct)

$$\sqrt{E: 1st coin is H}$$

$$\sqrt{F: 2n1 coin is T}$$

$$= \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

Gen:

$$P(E_1 E_2 \dots E_n) = P(E_1) P(E_2) P(E_3) \dots = \prod_{i=1}^n P(E_i)$$

$$in lop of eadb$$

$$\frac{n}{2}$$

$$\frac{n}{2}$$

 We can extend the concept of independent events and generalize it for n events as shown above. It's nothing but the product of all the events which are independent.

Timestamp 17.9

NOTE: if E&F are indep then E&F are also in?

$$P(E) = P(E \cap F) + P(E \cap F^{c})$$

$$= P(E) P(F) + P(E \cap F^{c})$$

$$P(E) = P(F^{c}) = P(E \cap F^{c})$$

$$P(E) P(F^{c}) = P(E \cap F^{c})$$

 As shown above if two events E and F are independent then E and F[^] are also independent. Timestamp 24.30

Timestamp 24.30

(e.g) An infinite seq. of totals lexpt (in tep) is performed

a success pools of the success in (in in tep)

a at least one success in (in in tep)

$$= |-P(no success in n totals)$$

$$= |-P(F_1 F_2 F_3 F_4 -- F_n)$$

$$= |-P(F_1) P(F_2) \cdots P(F_n) = |-(1-p)^n$$

Above is an example of using independent events to solve problems.