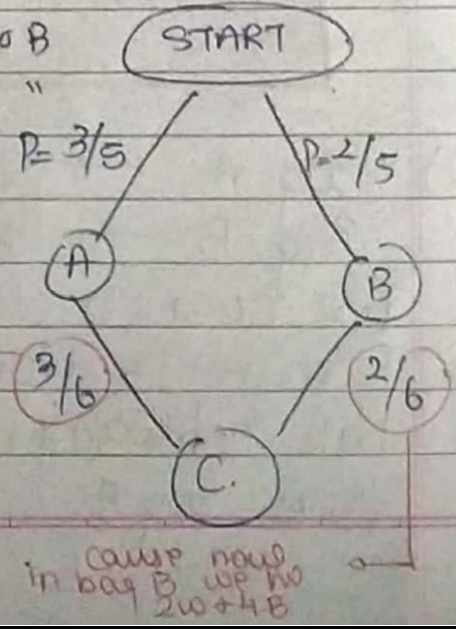
(O) Bag A → 3 white + 2 black balls
Bag B → 2 white + 3 black balls.
A ball is tranjected from bag A to B randomly and then a ball is drawn from B if it is found to be white find prob that transfered ball was black.

A :- transfer white from A → B
B :- transfer black " " "
C :- getting white.



∴ prob that transfered ball was black
= P(B/C) ⇒ prob of B such that C occurs
⇒ reverse
⇒ use formula

$$= \frac{P(B) \times P(C/B)}{P(C)}.$$

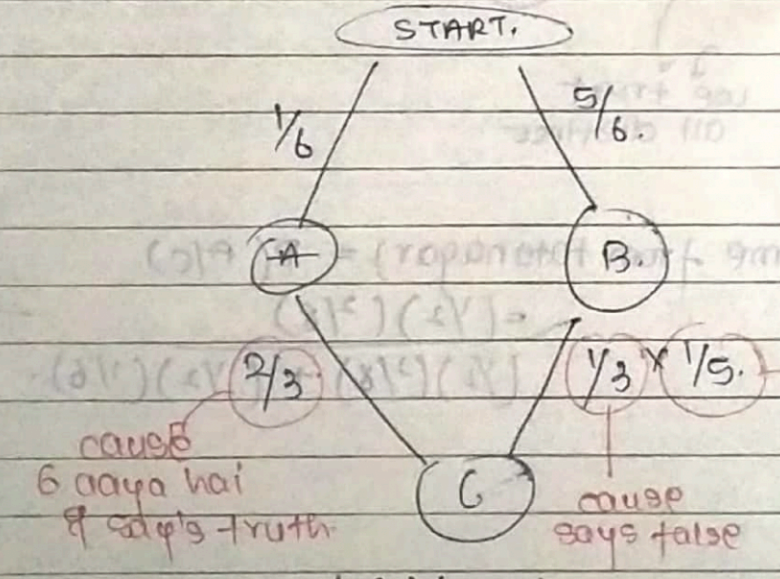
$$= \frac{(2/5) \times (2/6)}{(3/5)(3/6) + (2/5)(2/6)}.$$

(9) A man speaks truth 2 out of 3 times. He throws a die & reports the number as "6". Find the prob that it is actually "6"

Imp

→ to make events 1st always think the timeline.

Now before telling true/false the obs will see if outcome is "6" or not.



A :- getting "6"
B :- not getting "6"
C :- reporting "6"
↳ o says true/false.

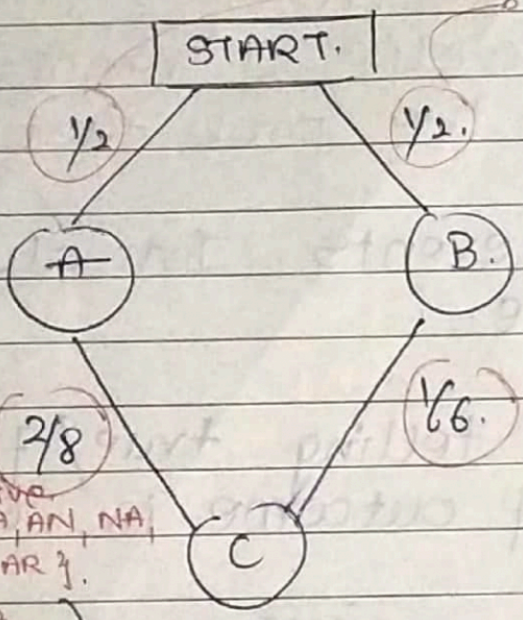
but this ~~also cause. suppose~~ he got "1" on disc so he reports "6" so for false we did P = 1/3 but now what take no. he says. he can say "2,3,4,5,6" but he wants to say "6" ∴ P = 1/5.

$$\therefore P(\text{actually } 6) = \frac{(1/6)(2/3)}{(1/6)(2/3)+(5/6)(1/3)(1/5)}$$

↳ ans

(Q) A letter is known to have come from either "TATANAGAR" or "KOLKATA" if somehow only two consequitive alphabets "TA" are visible on letter. Find prob that it came from TATANAGAR.

A:— came from "TATANAGAR"
B:— " " "KOLKATA"
C:— observing "TA"



if nothing metioned always assume 50% probability.

cause to see consequitive
$n(S) = \{TA, AT, TA, AN, NA, AG, GA, AR\}$.
$n(E) = \{TA, TA\}$.
we treat all distinct.

$n(B) = \{KO, OL, LK, KA, AT, TA\}$.
$n(E) = \{TA\}$

$\therefore P(\text{come from tatanagar}) = P(A/C)$

$$= \frac{(1/2)(2/8)}{(1/2)(2/8) + (1/2)(1/6)}$$ —o ans.

(9) An oil exploration company currently has two active projects, one in Asia and other in Europe. Let A be event that Asia project is successful and B be event that Europe project is successful. Suppose that A and B are independent events with $P(A) = 0.4$, $P(B) = 0.7$

(a) If the asian project is not successful, what is the probability that the European project is also not successful?

$= P(B'/A') = P(B'/A') = P(A' \cap B')/P(A') = P(A') \times P(B')/P(A') = P(B')$

since A and B are independent

$\Rightarrow A'$ and B' are also independent.

(b) What is the probability that atleast one of the two projects will be successful.

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

$= \boxed{0.82}$

(c) Given that atleast one of the two projects is successful. What is the prob that only asia prg is successful.

→ use venn-diagram to get req's

$= P((A \cap B')/(A \cup B))$

$= \dfrac{P((A \cap B') \cap (A \cup B))}{P(A \cup B)} = \dfrac{P(A \cap B')}{P(A) + P(B) - P(A \cap B)}$

(venn diagram)

$= \dfrac{P(A) - P(A \cap B)}{P(A) + P(B) - P(A)P(B)}$

$= \dfrac{P(A) - P(A)P(B)}{0.82}$

$= \dfrac{0.12}{0.82} = \boxed{0.1463}$ — ans.

(e) A & B throw a die alternately whoever gets 6 first, wins. If A starts first. Find prob that A wins.

→ $P(A) + P(\bar{A})P(\bar{B})P(A) + P(\bar{A})P(\bar{B})P(\bar{A})P(\bar{B})P(A) + \cdots \infty$

$P(A)$: A wins in 1st throw

$P(\bar{A})P(\bar{B})P(A)$: A doesn't get 6, B doesn't get 6, A gets 6 & wins

$P(\bar{A})P(\bar{B})P(\bar{A})P(\bar{B})P(A)$: A then ∩ B then A then B but 6 nahi aya dono tak, then A ko 6 aaya or jeet gaya

$$= \frac{1}{6} + \left(\frac{5}{6}\right)\left(\frac{5}{6}\right)\left(\frac{1}{6}\right) + \left(\frac{5}{6}\right)\left(\frac{5}{6}\right)\left(\frac{5}{6}\right)\left(\frac{5}{6}\right)\left(\frac{1}{6}\right) + \cdots \infty$$

$$= \frac{1}{6} + \left(\frac{5}{6}\right)^2\frac{1}{6} + \left(\frac{5}{6}\right)^4\frac{1}{6} + \cdots \infty$$

$$= \left(\frac{1}{6}\right)\left(1 + \left(\frac{5}{6}\right)^2 + \left(\frac{5}{6}\right)^4 + \cdots \infty\right)$$

$$= \left(\frac{1}{6}\right)\frac{1}{1-\left(\frac{5}{6}\right)^2} = \left(\frac{1}{6}\right)\frac{36}{11} = \boxed{\frac{6}{11}} \text{ ans.}$$

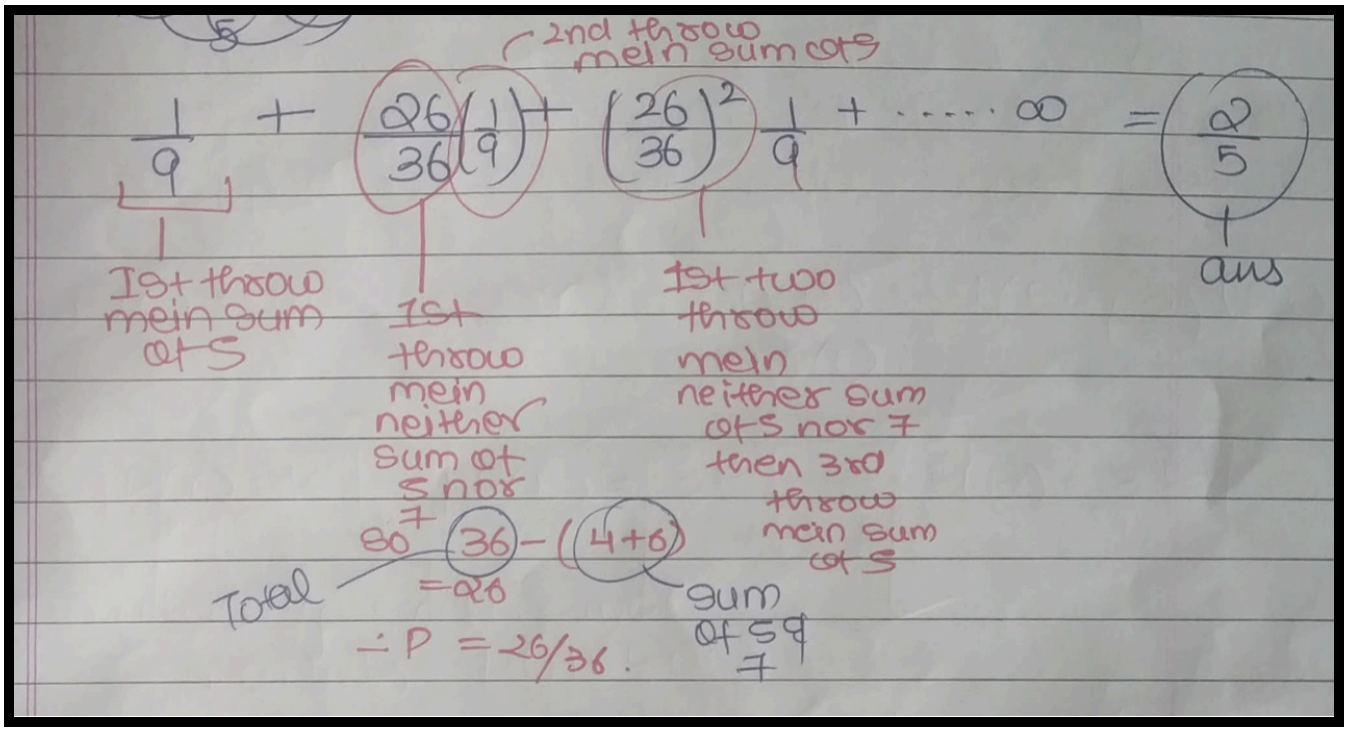
(f) A pair of dice is rolled till a sum of 5 or 7 is obtained. Prob that sum 5 comes before 7 = ?

→ Probability that sum is 5 = $\frac{4}{36} = \frac{1}{9}$

(1,4) (4,1) (2,3) (3,2)

Probability that sum is 7 = $\frac{6}{36} = \frac{1}{6}$

(6,1) (1,6) (5,2) (2,5), (4,3) (3,4)



(6) A system consists of two identical pumps, namely, #1, #2. If one pump fails, the system will still operate. However, because of added strain, the remaing pump is now more likely to fail than was originally the case i.e. $r = P(\#2 \text{ fails} / \#1 \text{ fails}) > P(\#2 \text{ fails}) = q$

If atleast one pump fails by the end of the pump design life in 7% of all systems and both pumps fail during that period in only 1% what is the probability that #1 fails during the pump design life?

∴ event A_1 = #1 fails
event A_2 = #2 fails.

∴ $P(A_1) = P(A_2) = q$
$P(A_2/A_1) = P(A_1/A_2) = r$ } — cause identical in nature.

∴ $P(A_1 \cup A_2) = 0.07$
$P(A_1 \cap A_2) = 0.01$ } — given

∴ $\frac{P(A_1 \cap A_2)}{P(A_1)} = P(A_2/A_1) \Rightarrow \boxed{0.01 = qr}$ — (I)

∴ $P(A_1 \cup A_2) = P(A_1) + P(A_2) - P(A_1 \cap A_2)$

∴ $0.07 = q + q - 0.01$

∴ $2q = 0.08$

∴ $\boxed{q = 0.04}$

∴ $\boxed{r} = \frac{0.01}{q} = \frac{0.01}{0.04} = \boxed{0.25}$