→ Probability → 3

$\rightarrow {}^nC_r \rightarrow$

1. → {1, 2, ..., n} ⇒ 'r' balls

a. Without Replacement → ${}^rC_1$ → m^{th} ball.

$$1 * (m-1) * (m-2) * (m-3) * \ldots * \{m-(r-1)\} * \frac{m}{m}$$

$$\Rightarrow \left(\frac{{}^mP_r}{m}\right) * \left(\ldots\right) * \left({}^rC_1\right) \Rightarrow \boxed{\frac{\frac{r}{m} * \left({}^mP_r\right)}{\left({}^nP_r\right)}}$$

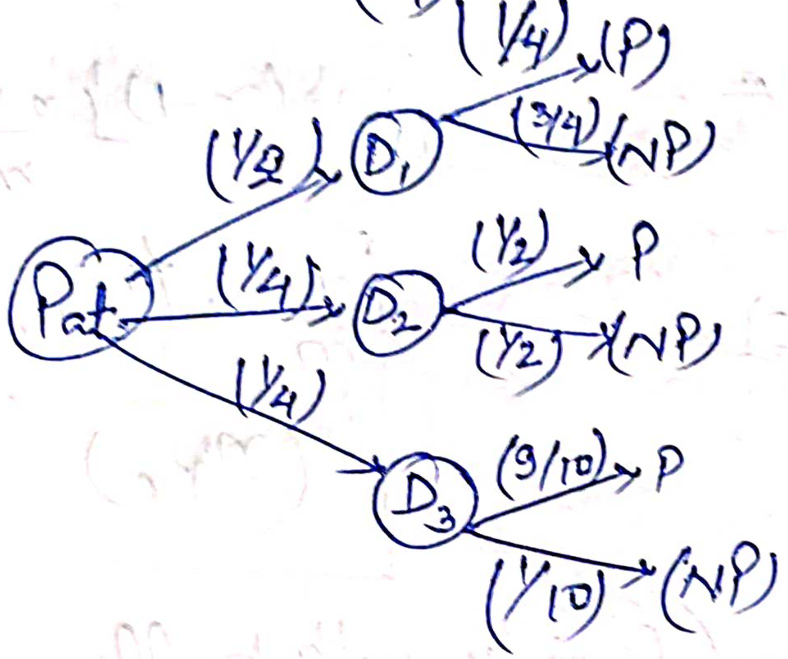
b. with Replacement → ${}^rC_1$ → m^{th} ball

$$P_r \Rightarrow \frac{({}^rC_1) * m^{r-1}}{n^r} \Rightarrow \boxed{\frac{r}{n} * \left(\frac{m}{r}\right)^{n-1}}$$

(2) → $D_1 : D_2 : D_3 \Leftrightarrow 2 : 1 : 1$

$D_1 \longrightarrow \left(\frac{2}{4}\right) = \left(\frac{1}{2}\right)$

$D_2 \longrightarrow \left(\frac{1}{4}\right)$; $D_3 \longrightarrow \left(1/4\right)$

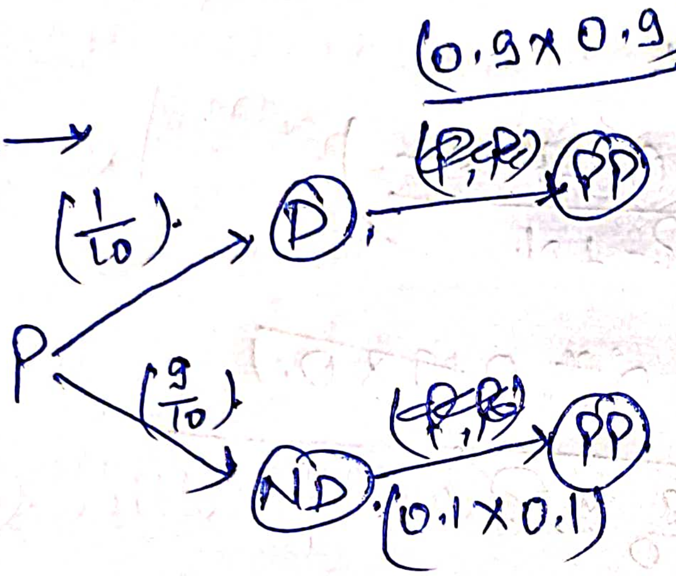


$P\left(\frac{P_1}{(2P, 1N)}\right) \Rightarrow \frac{P(A \cap B)}{P(B)}$

③. Monty-Hall Problem →

④. → 3-Prisoner's problem →

⑦. →



P,P

Pr(correct Diagnosis) = 0.9

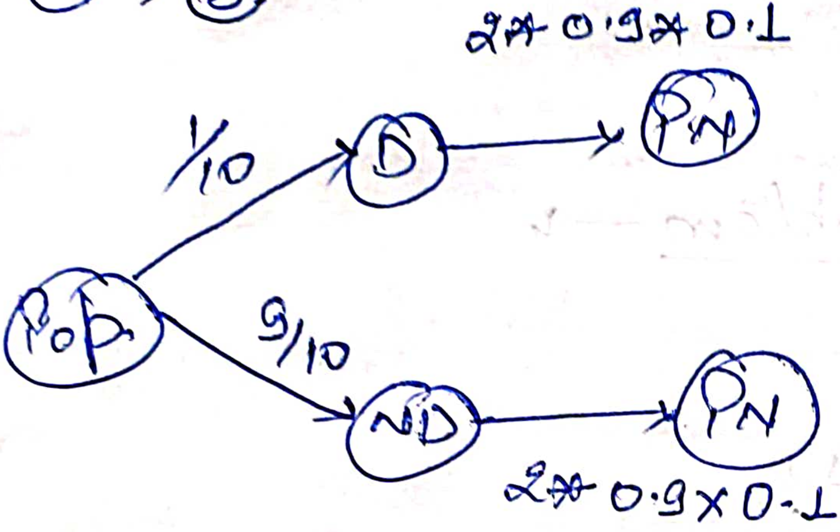
ⓐ → $P\left(\frac{D}{\text{Both } P}\right) = P\left(\frac{D \cap \text{Both } P}{\text{Both } P}\right)$

$$\Rightarrow \frac{\frac{1}{10} * 0.9 \times 0.9}{\frac{1}{10} \times (0.9)^2 + \frac{9}{10} * (0.1)^2}$$

$$\Rightarrow \frac{81}{81+9} \Rightarrow \frac{81}{90} \Rightarrow \frac{9}{10} \Rightarrow 0.9$$

7 → (b)

2! ⇒ 2



$$P\left(\frac{D}{1pos-1Neg}\right) \Rightarrow P\left(\frac{D \cap 1pos}{1P.-1N.}\right)$$

$$\Rightarrow \frac{\frac{1}{10} * \cancel{2 * 0.9 \times 0.1}}{\frac{1}{10} * \cancel{2} + \frac{9}{10} * \cancel{2}}$$

$$\Rightarrow \frac{1}{10} \Rightarrow 0.1.$$

9 → (a). $P\left(\frac{f_3}{C_3}\right) = (0.6)$; $P\left(\frac{C_3}{f_3}\right) = P\left(\frac{f_3}{C_3}\right) * \frac{P(C_3)}{P(f_3)}$

$$\Rightarrow 0.6 * \frac{0.1}{0.1 * 0.3 + 0.1 * 0.2 + 0.6 * 0.1}$$

$$\Rightarrow \frac{6}{11}$$ ✓

(b) $\rightarrow P\left(\frac{C_2}{F_3}\right) \Rightarrow P\left(\frac{F_3}{C_2}\right) * \frac{P(C_2)}{P(F_3)}$

(c) $\rightarrow P\left(\frac{C_2}{\text{at least one..}}\right) \Rightarrow P\left(\frac{C_2}{F_1}\right) + P\left(\frac{C_2}{F_2}\right) + P\left(\frac{C_2}{F_3}\right)$

(3) $\rightarrow$ (a). 2 children, 2 girls. P_K, G_K, B_K.

$P\left(\frac{\text{Having 2 children}}{\text{2 Girls.}}\right) = P\left(\frac{\text{2 Girls}}{\text{Having 2 children}}\right) *$

$P(\text{Having 2}$

$\Rightarrow \frac{Pr(\text{Having 2 children} \cap \text{2 girls.})}{Pr(\text{2 Girls.})}$.