DS & AI CS & IT

Statistics - I

(Discrete Random Variable)

Lecture No. 04



Recap of previous lecture









Topic acometric Distribution

(2) Binomial "

Topics to be Covered







Topic

- 3) Difference blu Hypergeometric & Rinomial Dist.
 - Y) POISSON DIST



Thumblule of his Chapter of Try to avoid making Brees tion by using following words;

The what if, (AGAR) YADI, TOM, 177

OR

Dm't Try to dwelop Question by your little mind until you have a complete understanding of the Chapter & toy to solve the Dust.

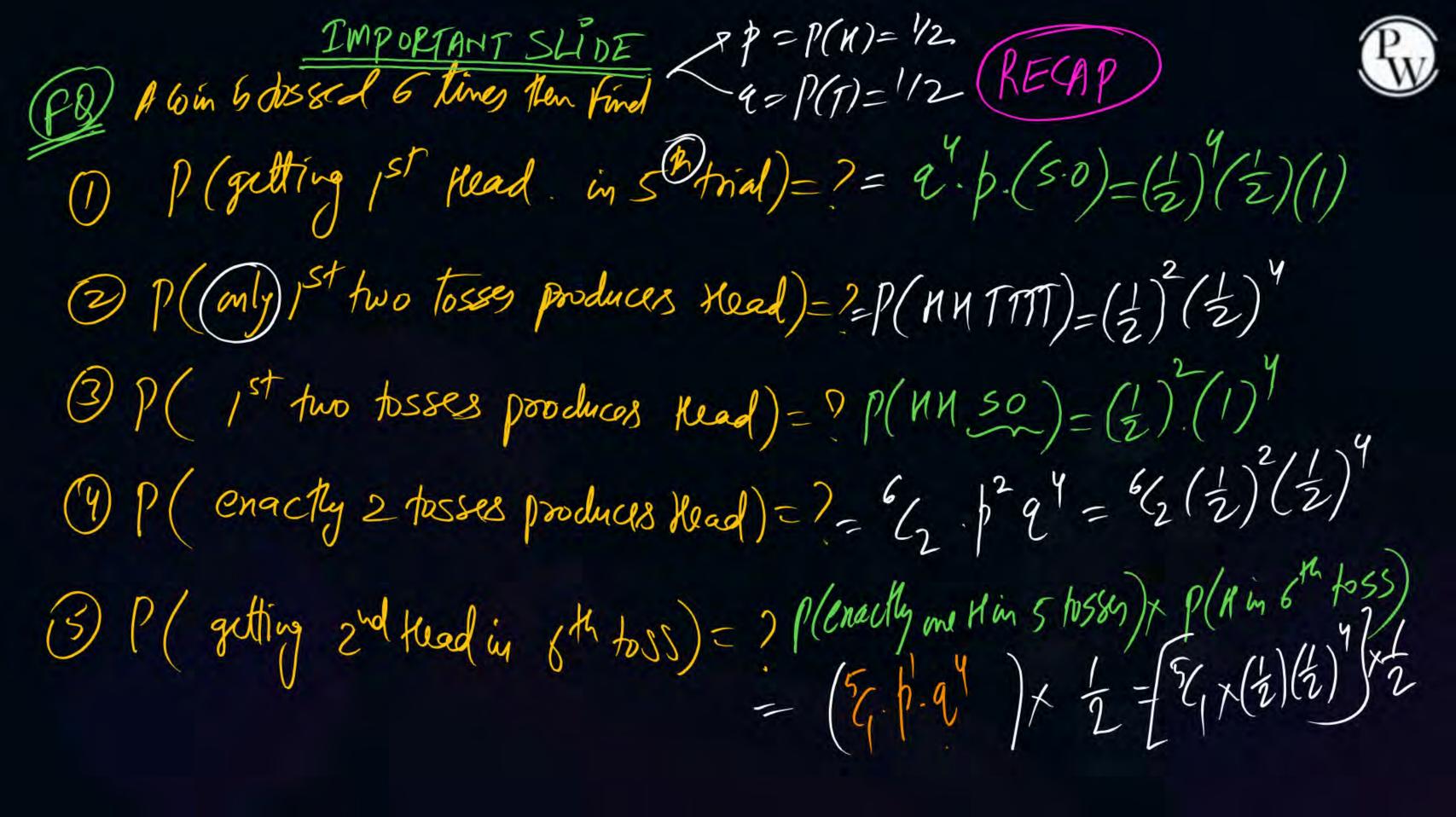


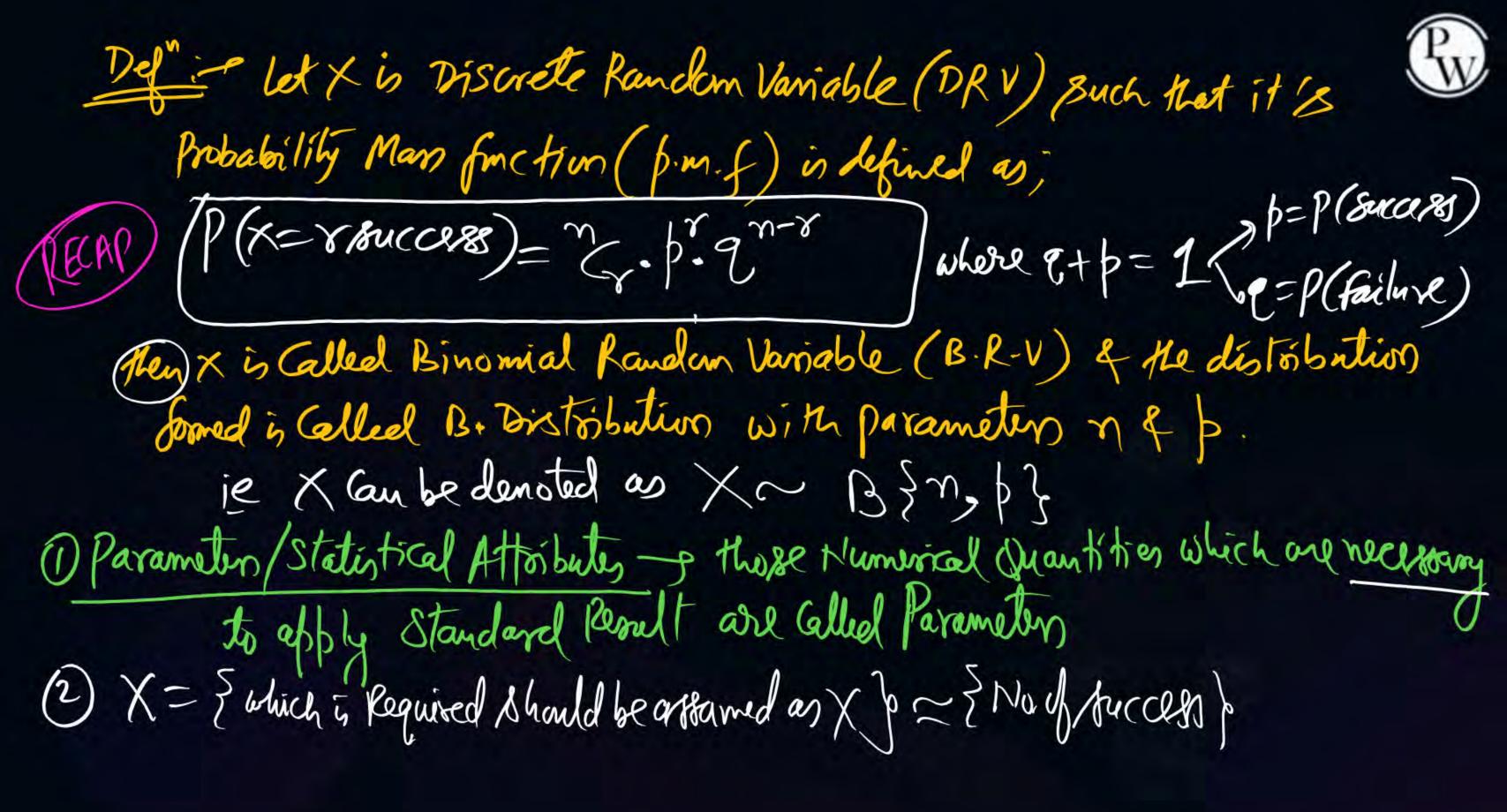


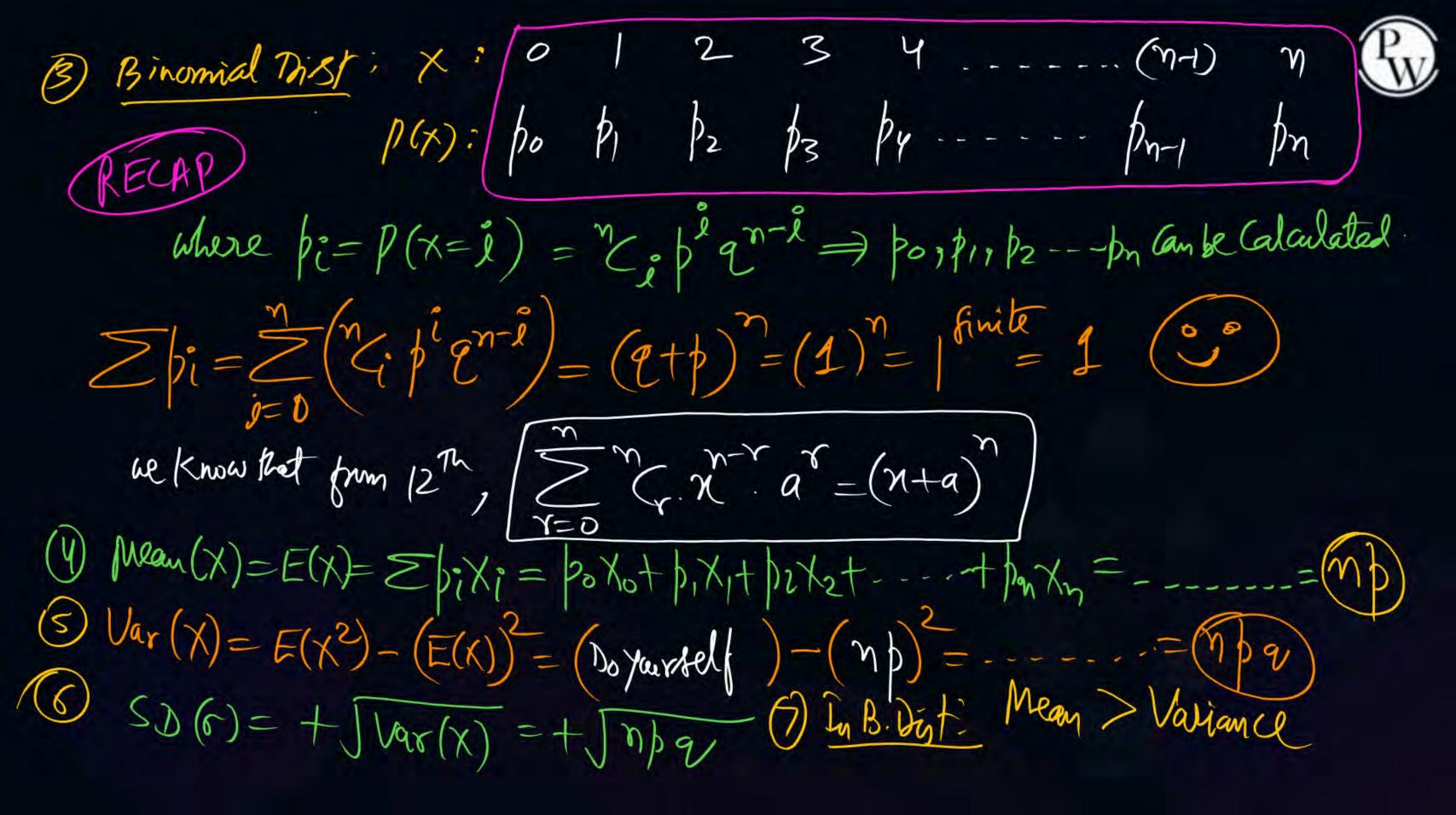
RECAP BINOMIAL DIST Hecessary Conel for B. Dist-T There are four H. Conditions; 1) Humber of Trials (R.Exp) should be finite ic n= finite (2) Each Trial (R.Exp) should be Independent. SICUMS (3) Each Trial (REXP) has only two possible unitomes known as Copillure ie (Each Trial must be of Bernoullie) Type)

(4) The prob of Buccess for each Trial (REX) should be constant.

Shortcut > whenever we are not sux about the location of success, we can apply B. Wist.







If X is a discrete random variable that follows Binomial distribution, then which one of the following

relations is correct?

Recurrence

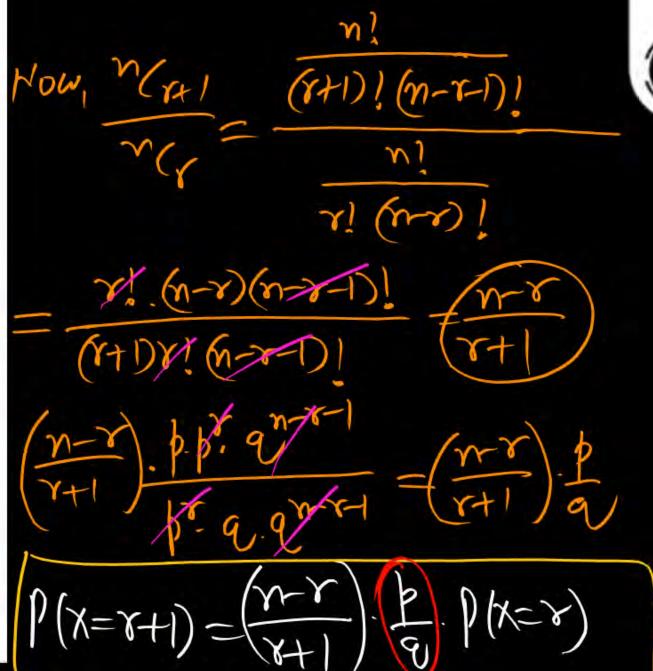
(a)
$$P(r + 1) = \frac{n-r}{r+1}P(r)$$

(b)
$$P(r + 1) = \frac{p}{q}P(r)$$

(c)
$$P(r + 1) = \frac{n+rp}{r+1q}P(r)$$

(d)
$$P(r + 1) = \frac{n-r}{r+1} \frac{p}{q} P(r)$$

80 P(X=8+1) = P(X=8+1)



$$P(x=1) = (n) \frac{1}{2} P(x=0)$$

 $P(x=2) = (n+1) \frac{1}{2} P(x=1)$ for $0n = --$



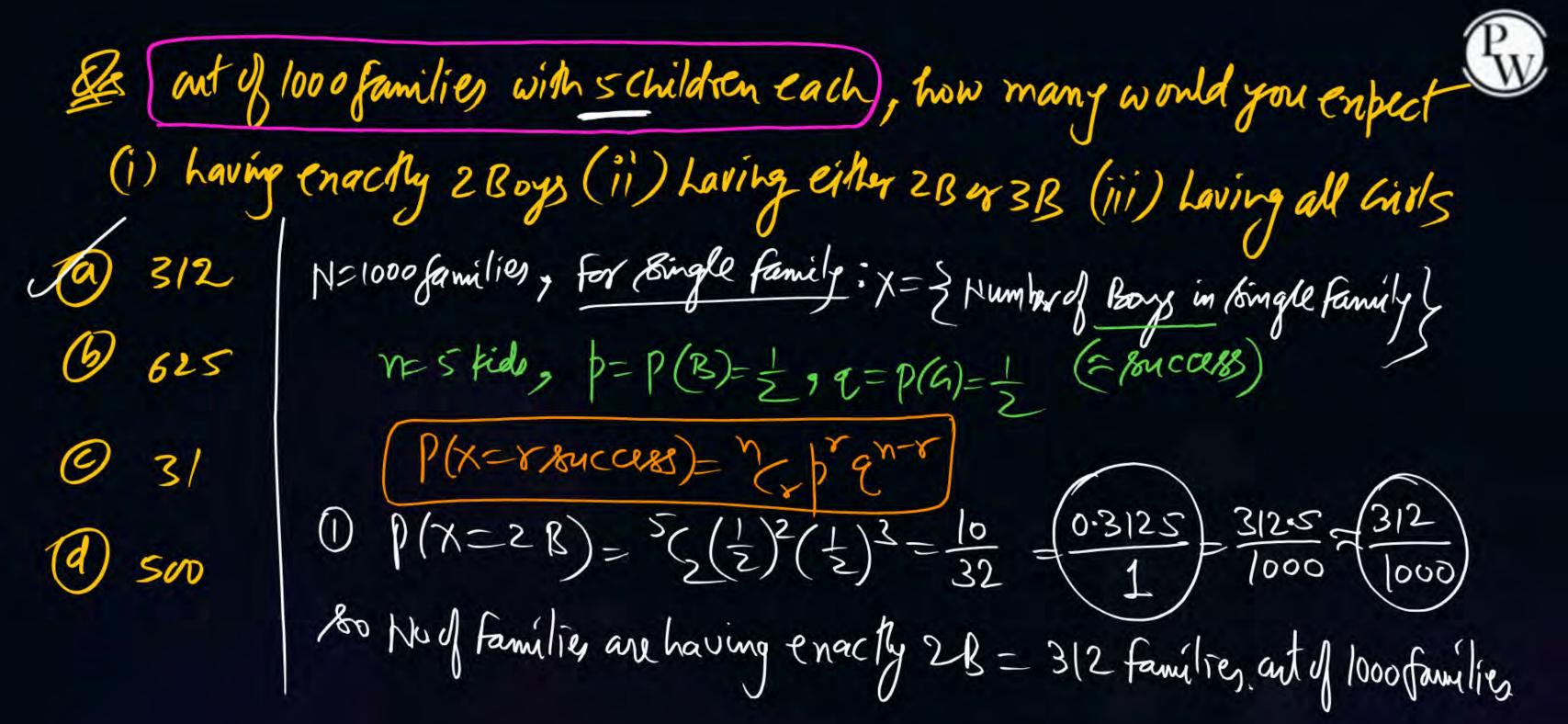
A fair dice is tossed eight times. The probability that a third six is observed on the eight throw is

log Mb=
$$P(gettingenactly 2 sin)$$
 in 1st > throws) $\chi P(6 \text{ in sh throw})$

$$= \left(\frac{Rsinumial for}{r=7, r=2} \right) \times \left(\frac{1}{6} \right)$$

$$= \left(\frac{7}{6} \right)^{2} 9^{5} \times \left(\frac{1}{8} \right) = \left(\frac{7}{6} \times \left(\frac{1}{6} \right)^{2} \left(\frac{5}{6} \right) \right) \times \frac{1}{6}$$

$$= \frac{1}{6} \frac{1}{6}$$





(2)
$$p(x=2B \text{ or } 3B) = p(x=2B) + p(x=3B)$$
 {Add due to (m. E) Nature}
= $\frac{5}{2}(\frac{1}{2})^2(\frac{1}{2})^3 + \frac{5}{3}(\frac{1}{2})^2(\frac{1}{2})^2 = \frac{20}{32}$

$$=$$
 $\left(\frac{6.625}{1}\right) = \left(\frac{625}{1000}\right)$ 80 An $=$ (625) families

Note in X = { No. of Boys = { 0,1,2,3,4,5} = S. Stace, where S. Space = { (0845G), (1844G), (2843G), (3842G), (4841G) (5840G) }, (5840G) }

ANALYSIS / PODCAST:- X= 3 HO. BBoys }= 30,1,2,3,4,53



$$p_2 = p(x=2B) = {(2)^2(2)^3} = 0.31250$$

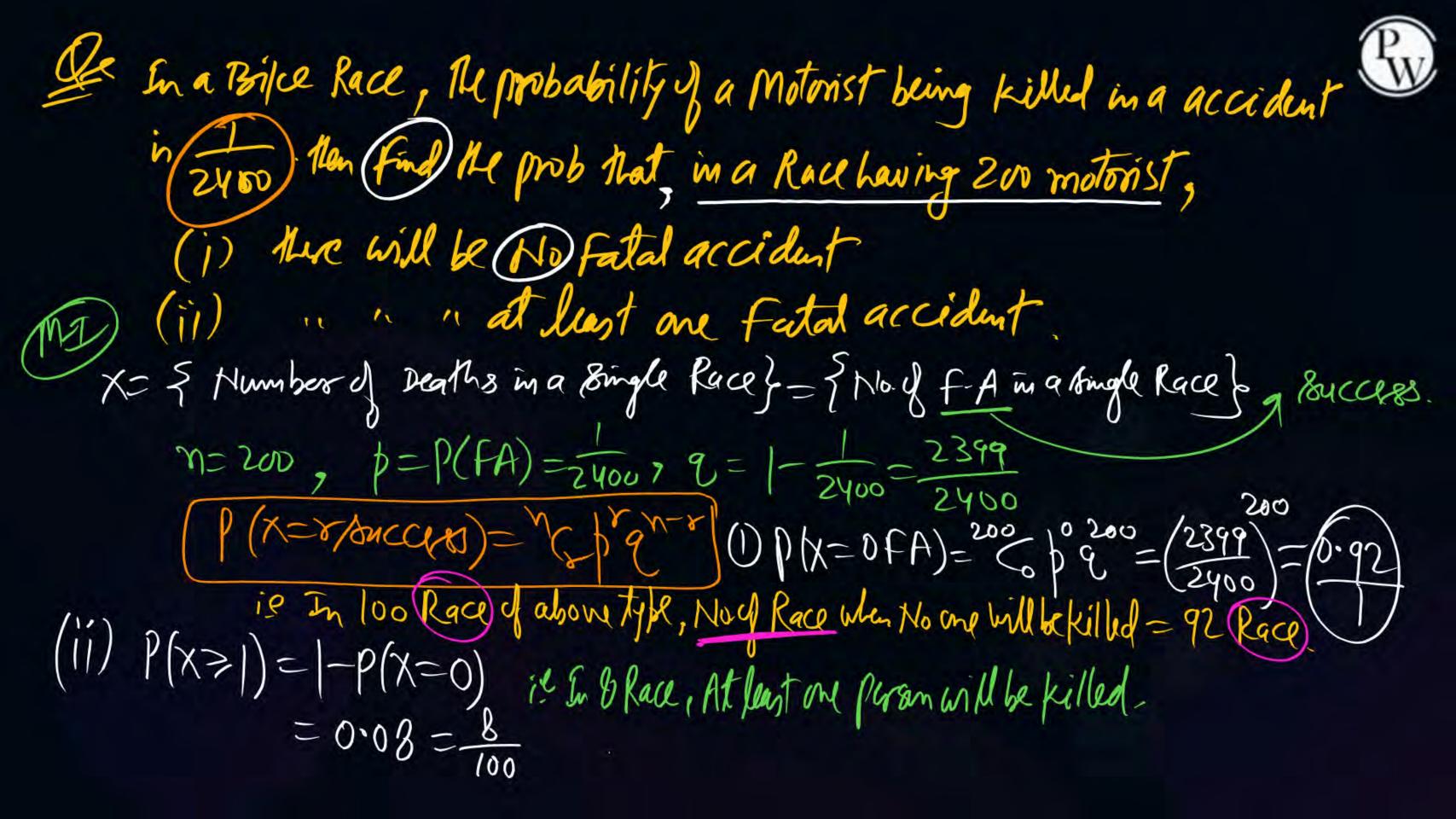
$$|\beta| = b(x = AB) = 2(\frac{2}{5})(\frac{2}{5}) = 0.128520$$

$$|z| = b(x = 2B) = C(7)(7) = 0.03152$$

In 1000 families, Various Cases are 95 follows; - 8 (013459) or (113446) or (213439) or (313426) or (413416) or (513406)= Ital Carses. 0.03125 + 0.15625 + 0.31250 + 0.31250 + 0.15625 + 0.03 125= 1 $\sqrt{31.25+156.25+312.50+312.50+156.25+31.25}=1000$ enactly 2Box 3B

for I Latch families, Data will be as follows, (": Both are ME)

(3152) + (12852) + (31520) + (31520) + (12852) + (8152) = 100000



Using Common (sense - ...
(mil) P (killed) = 1/2400 7 P (Hot killed) = 2399
2400



$$=\left(\frac{2399}{2400}\right)^{200}=0.92$$

MID Usin POISSON DIST



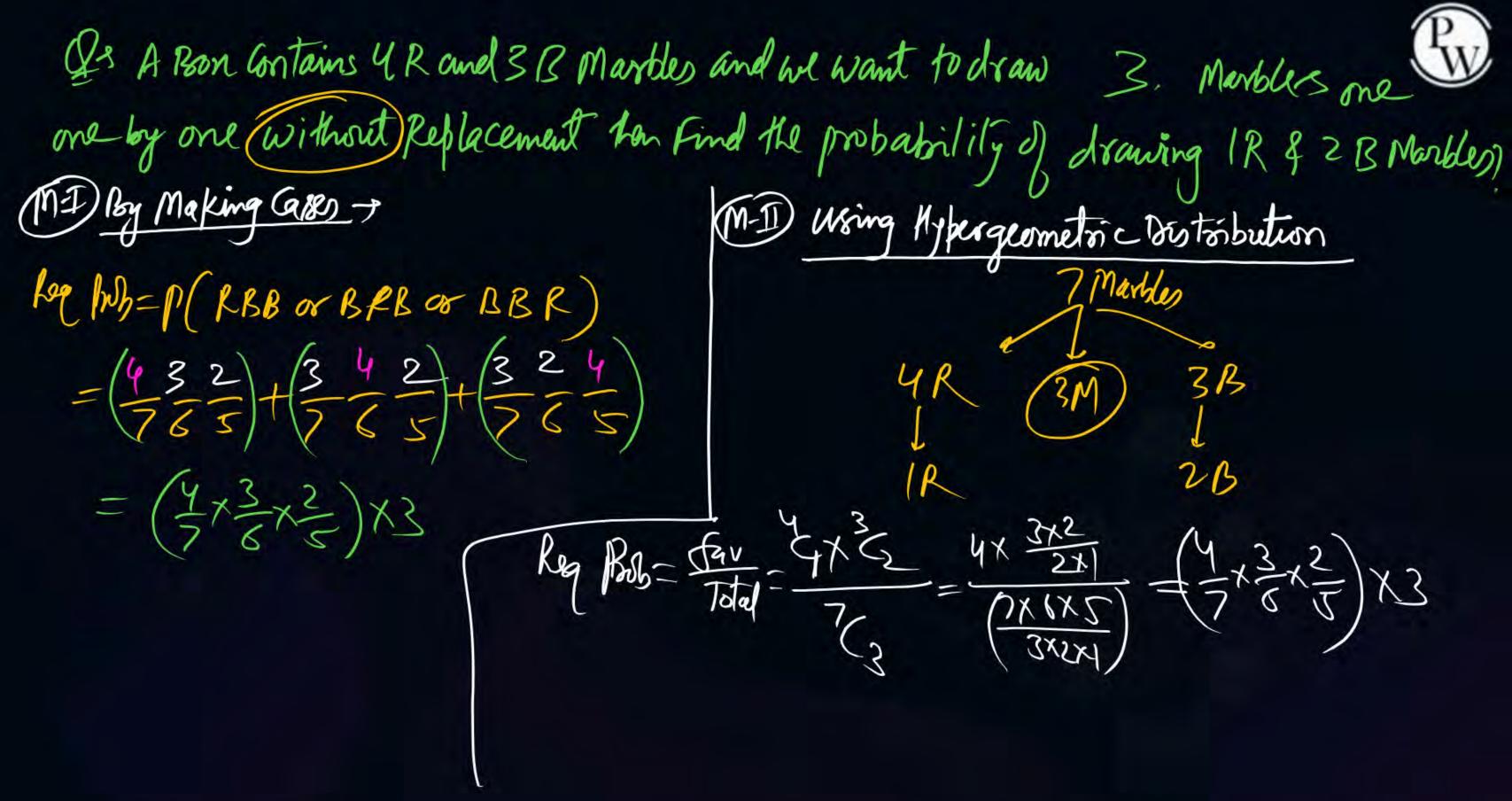
will be discussed in next chapter is in POISSON DIST



ANALYSIS OF HYPERGEOMETRIC & BINOMIAL DIST

Here we can also use the concept of Kyper geometric vist.

If we are per forming R. Exp one by one with Replacement
then we can also use the concept of Rinomial vistribution

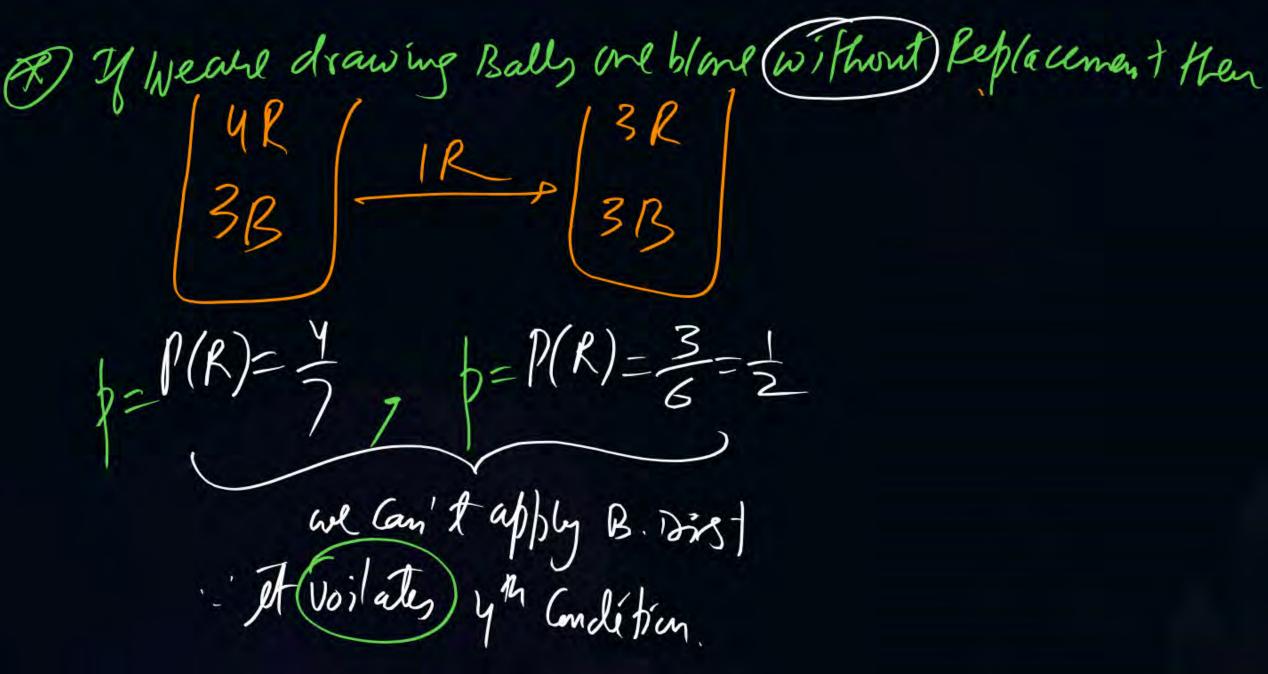


4. A Bon Contains 4 R and 3 B Martles and We want to draw (3). Marbles one Bu one by one with Replacement ton Find the probability of drawing (R) & 2 B Morbles).

(F) By Making Cases:-1

(F) Using Binomid Distribution:-1 (MI) By Making Cases:-1 Rep Prob = P(RBB or BFB or BBR) $-\left(\frac{4}{7},\frac{3}{5},\frac{3}{5}\right)+\left(\frac{3}{5},\frac{4}{7},\frac{3}{7}\right)+\left(\frac{3}{7},\frac{3}{7},\frac{4}{7}\right)$ =(3×3×3)×3

KE & Number of Red Balls & success, n=3, p=p(RB)=4, 9=p(BB)=== P(X=1RB)=3((4)(3)(3)2 =3x(4)x(3x3)







De There are 10 Calcie on a Table in which 6 are reflective of 4 are Han Def. & we want to draw (three) Calci one by one (w/o) Replacement then Find the prob that there will be enactly (one) refective?

Reg Prob= P(DHHCY NDHCY NND)

already discensed in last lect of Bob

MI) By Making Cases - (Th I) using Hypergeometric Dist -6 Det 3 Calci 4 N. My. Repholo-f= already discussed is lee 6 of Bob.



De There are 10 Calcie on a Table in Which 6 are reflective of 4 are Han Def. & we want to draw (three) Calci one by melwith Replacement then

$$=\left(\frac{6}{10}\times\frac{4}{10}\times\frac{4}{10}\right)\times3$$

Find the prob that there will be enactly one Defective?

(MI) By Making Cases - (MI) Using Dinumial bist) - 4

Report - P(DNN ON NDN ON NND) X-2 Number of Defective?

Success.

POISSON DISTRIBUTION



It is a particular case of Binomial poist under following conditions;

(1) n -> 00 (very large) { Nexe 3 Conditions will be taken as

(2) p-> 0 (very small) { Necessary Conditions for Poisson Dist.

(3) np-> 7 (is constant)

(Shortcut:) whenever we are not source about n, But we can find it's Average Value (2).

Then we can apply Poisson Dist.

Important Conclusion: - if (Sunt in Based on Binnmed Vist) = (then it can also be solved by Prisson)

(nf) are given) (T=n)=(au be Calculated)

(But toke Case) if n is Somall, use A bist of if n is large use P. Dist.



P(x=xsuccess)= \frac{\varepsilon{\varepsilon}{\varepsilon} \frac{\varepsilon}{\varepsilon!} \frac{\

then x is Called Poisson Random Variable with parameter ? & it is denoted as X~ P{?}

Note (1) X= { which is Required} gouccess.

2) Prob Dist: X: 0 1 2 3 4 - - - m where Epi=1

Wher pi=(2)



(3) Mean (x)=E(x)=Zpixi=pototpixit...+pnxn

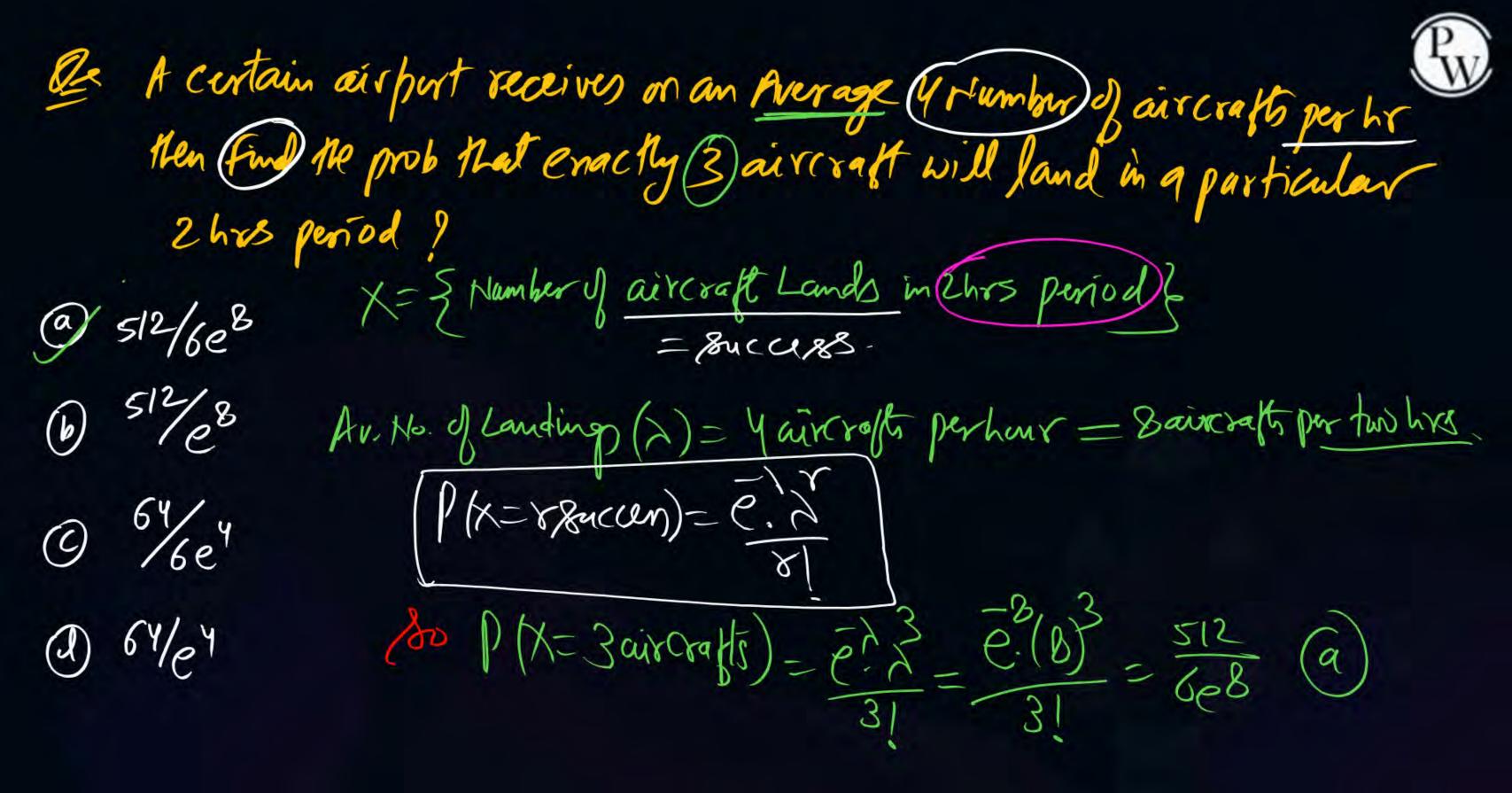
(5) S.D (6) = Si g In Carse of Poisson vist, Mean = Variance 6 2 Average per unit time or Average per unit data

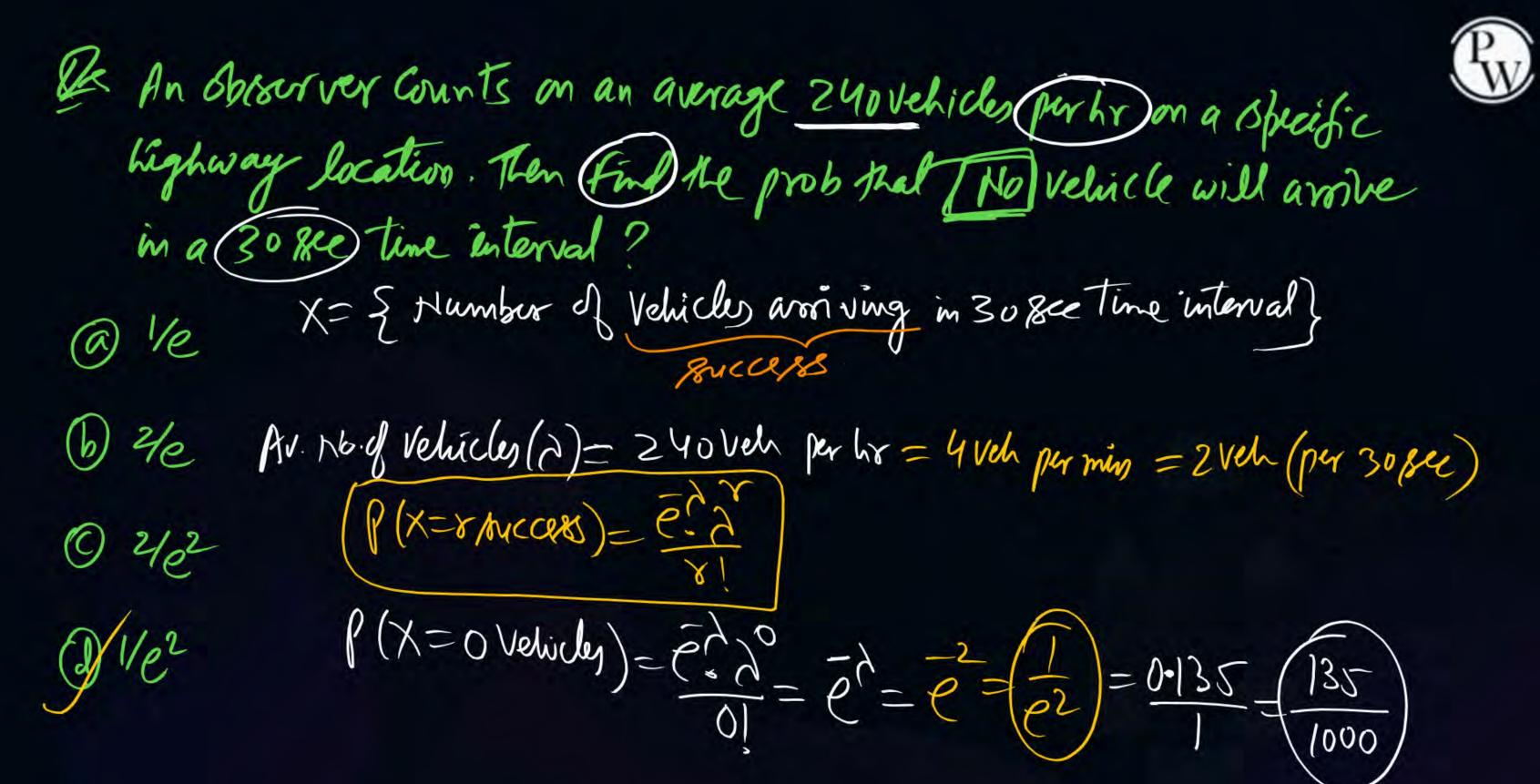
g(i) If on an Average Scostomers arrive at ticket window per min then 2 = 5 per min

g(ii) , " I Customer arrives at " in every 5 mins then 2 = 5 per mins

eg(iv) " in a time span of 5 mins then

eg(iv) " in a time span of 5 mins then 2= 3 permin





Dout of 1000 intervals of 30 sec each, Humber of Times when No vehicle will arrive = 135 times 2) 7=240 Veh/hr = 240 Veh/min = 4 Veh/nin = 4 Veh/see = 15 Veh/see. = 30 keh (30,800) = 2 veh per 30,800 2=240 veh pushr=4 veh per min = 2 veh per 30,8ee. - 1 2=240 veh per hr = 4 veh per nim = 1 veh per see >> >= (2) Veh / thirty see

The average amount earned by a employee is 2 rupees per day. What is the probability that 3 rupees will be earned tomorrow?



(a) 0.85

(c) 0.18

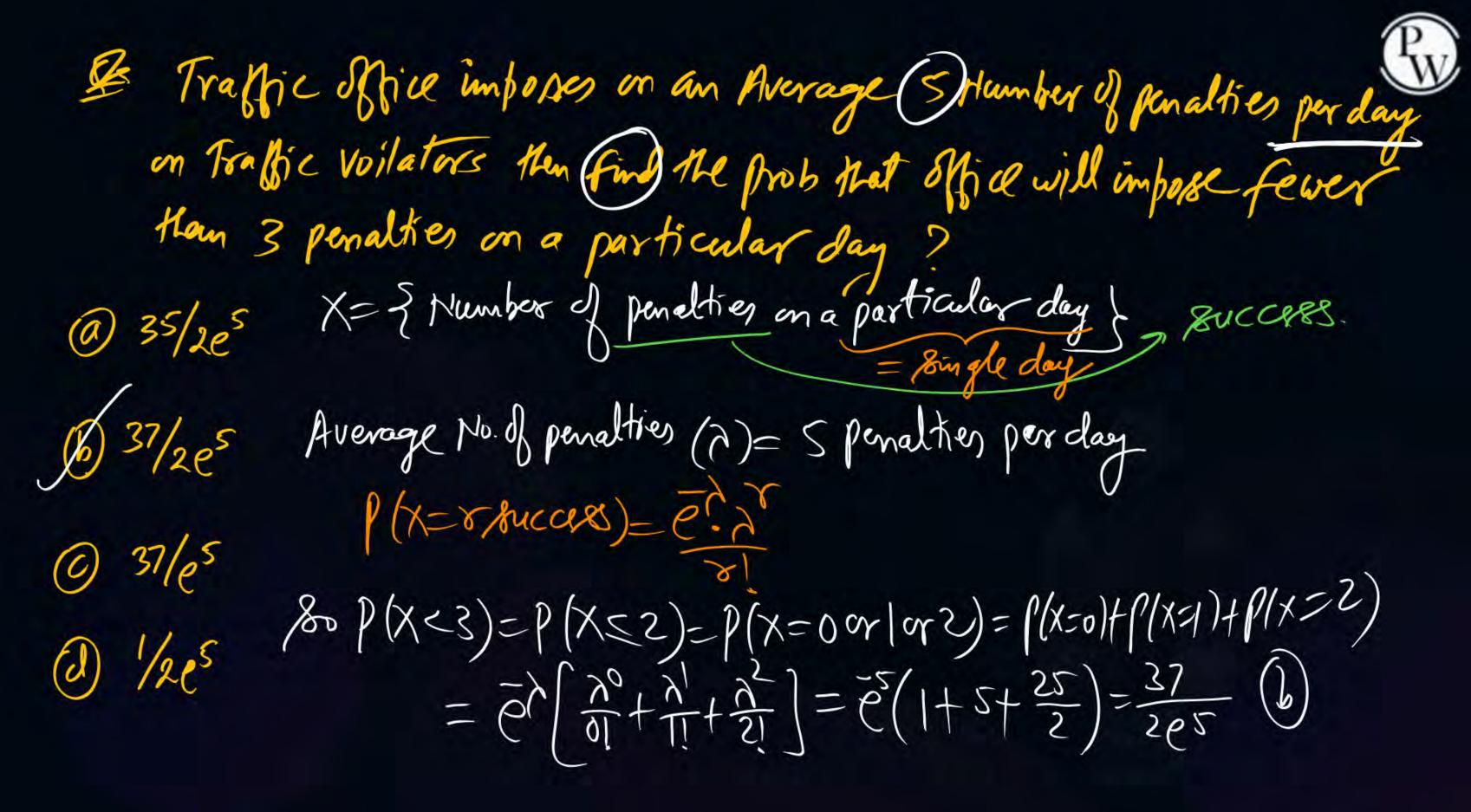
(b) 0.75

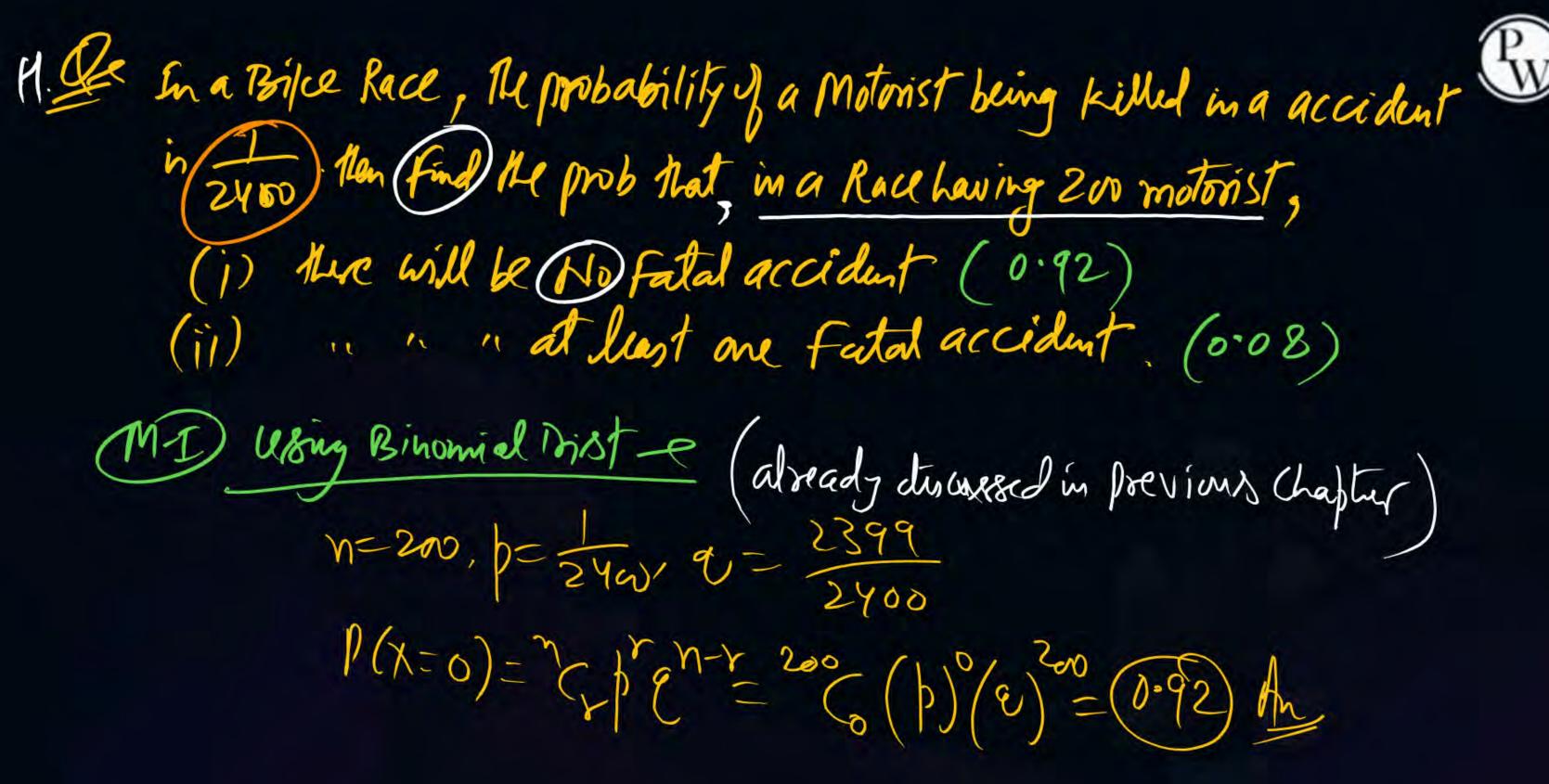
(d) 0.32



X=
$$\frac{2}{4}$$
 Amount earned by employee tomorrow's = $\frac{1}{8}$ single day

$$P(X=3R) = \frac{1}{2} \cdot \frac{3}{3} \cdot \frac{2}{6} \cdot \frac{3}{6} = \frac{8}{6} \cdot \frac{3}{6} = \frac{8}{6} \cdot \frac{3}{6} \cdot \frac{3}{6} = \frac{8}{6} \cdot \frac{3}{6} \cdot \frac{3}{6} \cdot \frac{3}{6} \cdot \frac{3}{6} = \frac{8}{6} \cdot \frac{3}{6} \cdot$$







M-I) Using Poisson DisT- X-3 Modf. Air one Ray & Senccess. n=200 Bikers.

80 Av. No. of FA in one Race (7)= np= 200x = (12) FA per Race. $0) \quad f(x = 0 \text{ FA}) = \frac{-\lambda}{e^2 \cdot \lambda} = \frac{-\lambda}{e^2} = \frac{-\lambda}{e^2} = \frac{-\lambda}{e^2} = 0.92 \text{ As}$

(2) P(at least one FA) = ? = 1-p(None) Note: out of 2400 Popers, Average Number of Poikers killed in an Arcidut = 1

Average...

Average...

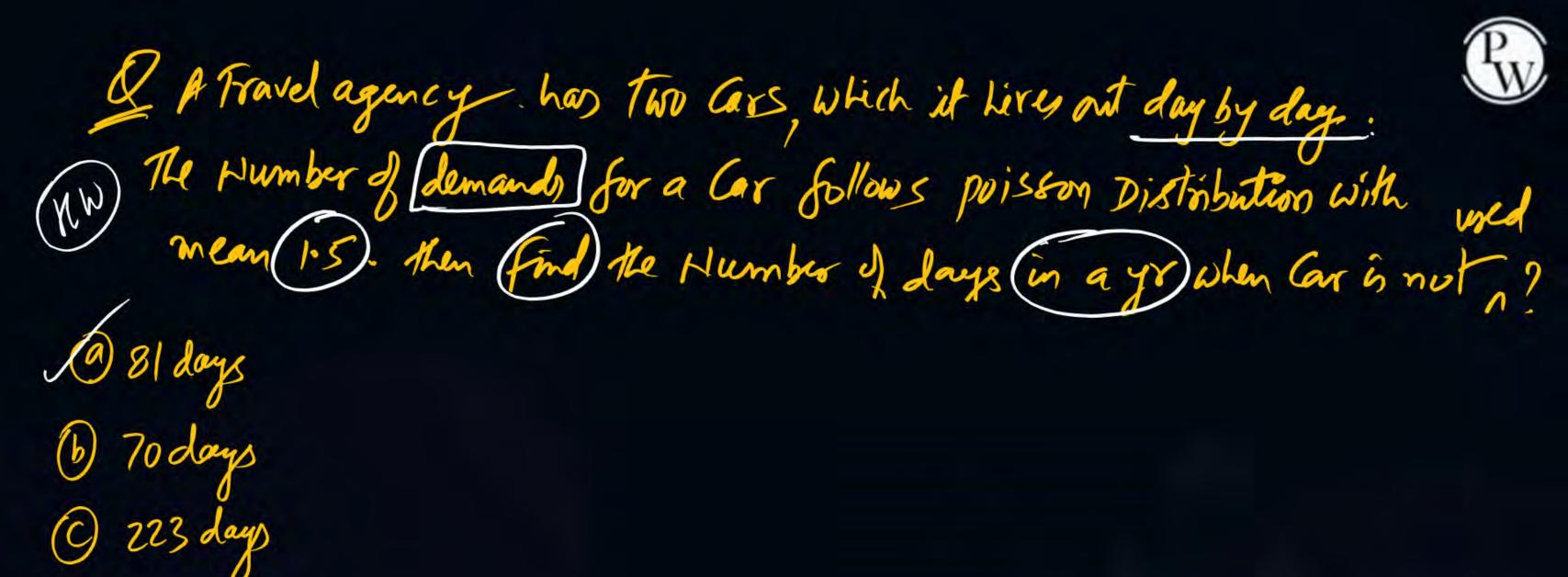
Average...

Average...

Average...

Average...

Average...



(d) 19 days

(11) find the Number of days in a great when some demands one refused?

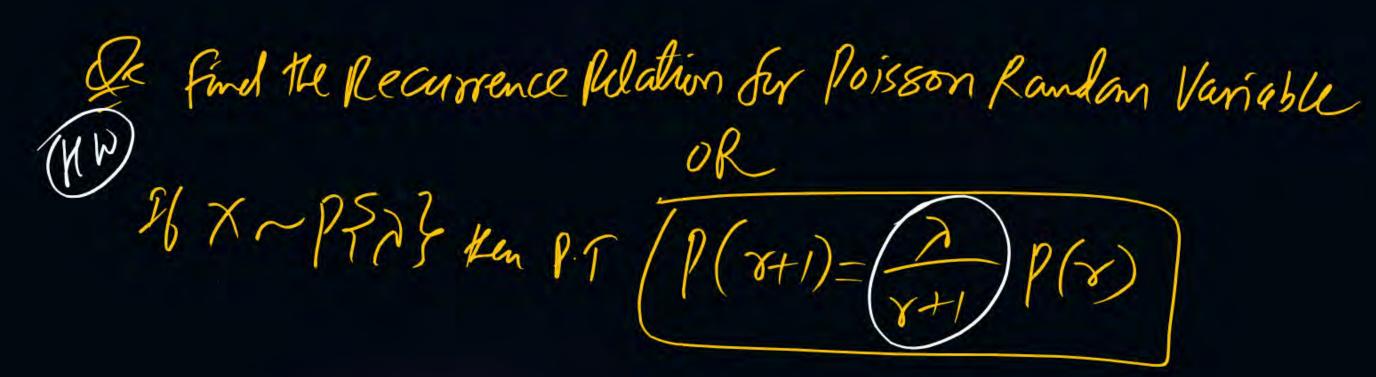
16) 70 days

(9) 223 days

(d) 19 days



If x is P.R. V st (P(x=1)= P(x=2) then Find Variance of x?









Dr Puncet Sirpw

ODRPUNEETSIRPW



Happy Learning