Day 5

Friday, December 15, 2023 8:35 AM

x

variable : # of Heads ← Experiment : flip a coin 3 times

0 $P(T \cap T \cap T) = \frac{1}{2}\cdot\frac{1}{2}\cdot\frac{1}{2} = \frac{1}{8}$

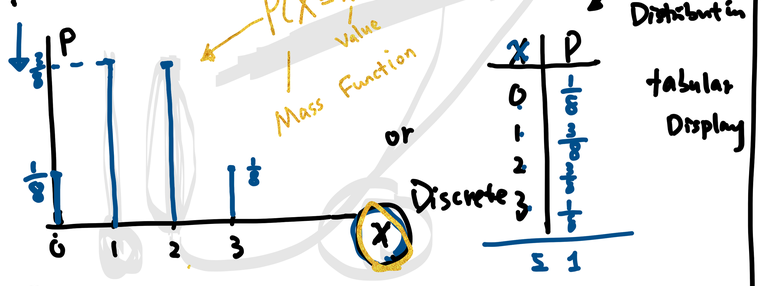
1 $\frac{3}{8} = \frac{1}{2}\cdot\frac{1}{2}\cdot\frac{1}{2}\cdot 3 = \frac{3}{8}$ $P(H \cap T \cap T)$ or $P(T \cap H \cap T)$ or $P(T \cap T \cap H)$

$\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}$ +

2 HHT HTH THH

3

.



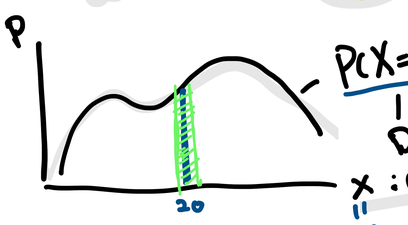
variable / Value / Mass Function

$P(X=x) = f(x) = 3C_x\left(\frac{1}{2}\right)^x\left(\frac{1}{2}\right)^{3-x}$

or

X	P
0	$\frac{1}{8}$
1	$\frac{3}{8}$
2	$\frac{3}{8}$
3	$\frac{1}{8}$
Σ	1

Probability Distribution tabular Display



$P(X=x) = f(x)$ Density Function

X : Continuous 11 age 20.111

$P_r(19.5 < X < 20.5)$

$P_r(X=20) = 0$

50% 50% 50%

20

Bernoulli process :

experiment :

- n identical trials : n=3
- each trial: success : H / Failure : T
- P_r(success) = constant
- trials are independent of each other

Discrete Random variable

variable :

X : # of successes ⇒ X ~ Binomial P.D.

$P(X=x) = nC_x\, p^x (1-p)^{n-x}$

n=3 $p=\frac{1}{2}$

$P(X=2) = 3C_2\left(\frac{1}{2}\right)^2\cdot\frac{1}{2}^1 = \frac{3}{8}$

experiment :

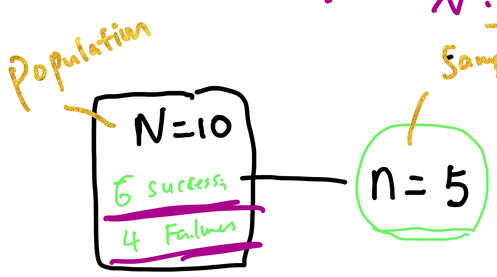
n=20

$P_r(X \geq 10) = P(X=10) + \cdots + P(X=20)$

$P(X=10) = 20C_{10}(0.6)^{10}(0.4)^{10}$

$1 - P(X \leq 9)$

Hypergeometric P.D. : X : # of successes in the sample



$P_r(S1) = \frac{6}{10}$.

$P_r(S2) = \frac{5}{9}$.

$\frac{6}{9}$.

$P_r(X=3)$

n trials

trial — Success / Failure

P_r(success) differs

trials are dependent of each other

$$P_r(X=x) = \frac{{}_SC_x \cdot {}_FC_{n-x}}{{}_NC_n} = \frac{{}_SC_x \cdot {}_{N-S}C_{n-x}}{{}_NC_n}$$

$$nC_x = \binom{n}{x} = \frac{\binom{S}{x}\cdot\binom{N-S}{n-x}}{\binom{N}{n}}$$