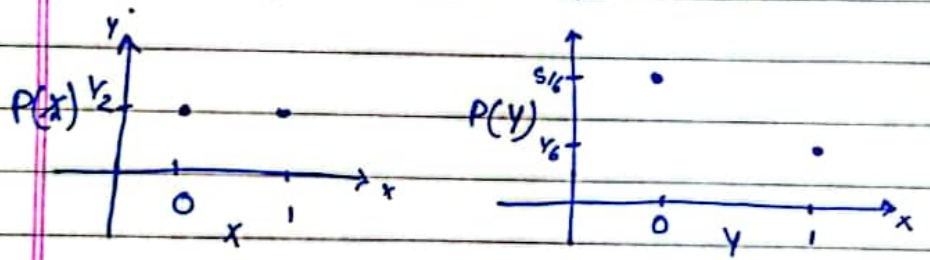
Probability

DATE : __/__/__
PAGE : _____

* Types of Random Variable (R.V.
1) Discrete (countable) → Bernoulli R.V. → Binominial R.V.
2) Continuous (uncountable) → Uniform R.V. → normal R.V.

* Bernoulli R.V. :- defines sucess or failure of R.V. (0,1)
R.E. → Flippin a coin ; SS → {H, T}
R.V. → X → getting a head → 1 , 0
X: SS → {0, 1} ; ⇒ P(X=0) = P({T}) = 1/2 ; P(X=1) = P({H}) = 1/2
R.E; Rolling a dice : SS = {1.2.3.4.5.6}
R.V. → Y = getting a 6 is is success
Y: SS → {0, 1}
P(Y=0) = P({1,2.3.4,5}) = 5/6
P(Y=1) = P({6}) = 1/6



we see
P(X=0) = p
P(X=1) = 1-p
ie. Probability distribution formula

* Binomial R.V. :- its a collection of Bernoulli R.V.
R.E. → Flipping 4 coins
SS → {HHHH, HHHT, HHTH, HTHH ... TTTT} (16)
R.V. X ⇒ Count no of head
X: SS → {0, 1, 2, 4} → n = 4
P(X=0) = P({TTTT}) = 1/16
P(X=1) = P({TTTH, TTHT, THTT, HTTT}) = 4/16 = 1/4
P(X=1) = $\left(\frac{1}{2}\right)^{4-1} \times \left(\frac{1}{2}\right)^{1} \times {}^{4}C_{1}$

$$P(X=i) = {}^{n}C_{i} \times (p)^{i} \times (1-p)^{n-i}$$

So,
$$P(X=2) = {}^{4}C_{2} \times \left(\frac{1}{2}\right)^{2} \times \left(1-\frac{1}{2}\right)^{2} = \frac{4\times3}{2} \times \frac{1}{4} \times \frac{1}{4} = \frac{6}{16} = \frac{3}{8}$$