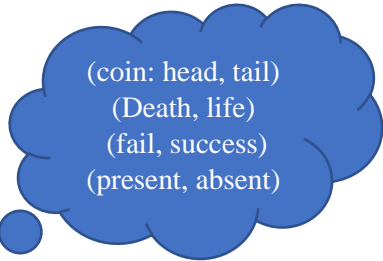


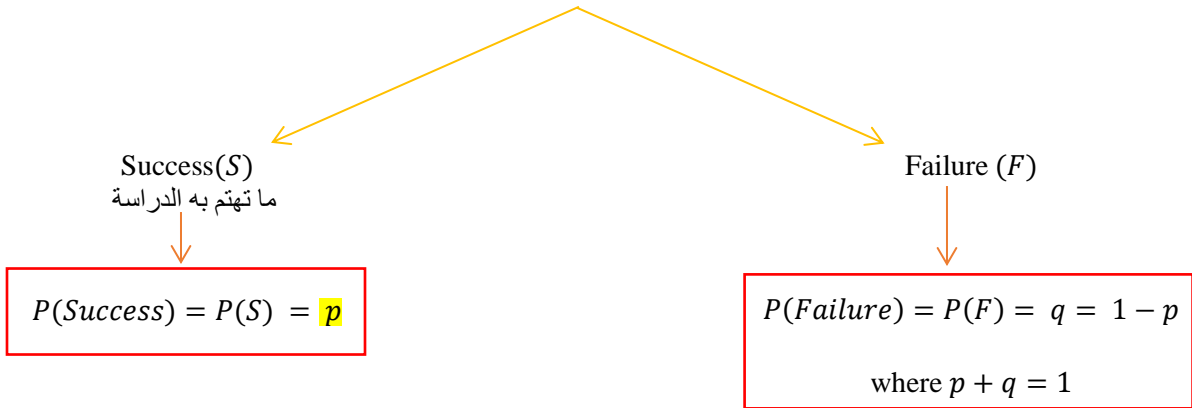
"Discrete Distributions"

From page 64 to page 65

"1) Binomial Distribution"



Experiment contain n independent trials
For each trial we have **Two outcomes**



* n : Sample size or number of repeating the experiment (n given in the question)

* X : Number of successes in n independent trials, ما تهتم به الدراسة

* p : probability of successes on an individual trial.

*The **probability mass function** or the **probability distribution** is

$$P(X = x) = f(x) = \binom{n}{x} (p^x) ((1 - p)^{(n-x)}), \quad x = 0, 1, 2, 3, 4, \dots \dots \dots n$$

- $\binom{n}{x} = nCr$ is the Combinations.
- The parameter of Binomial distribution are n, p
- $X \sim Bin(n, p)$
- The mean or the expected value is $\mu = n \times p$
- The variance is $\sigma^2 = n \times p \times q$
- The standard deviation is $\sigma = \sqrt{n \times p \times q}$
- If $n = 1$ then the binomial distribution it will be a Bernoulli distribution.

How to read it?????

For example, if we have 4 trial i.e. $n = 4$ then

x	0	1	2	3	4
the values of the number of successes	It is means that we have 0 success and 4 failure	It is means that we have 1 success and 3 failure	It is means that we have 2 success and 2 failure	It is means that we have 3 success and 1 failure	It is means that we have 4 success and 0 failure

Note for example in page 65 to how put it in the calculator:

X : the number of men with high blood pressure in the sample of 6 men.

$p = 0.15$: the probability That a man has high blood pressure.

$$P(X = x) = f(x) = ({}^6C_x) \times (0.15^x) \times ((1 - 0.15)^{(6-x)})$$

for $x = 0, 1, 2, 3, 4, 5, 6$

4)

$$P(X = 2) = f(2) = ({}^6C_2) \times (0.15^2) \times ((1 - 0.15)^{(6-2)})$$

5)

$$P(X \leq 2) = P(X = 0) + P(X = 1) + P(X = 2)$$

$$= \sum_{x=0}^2 (({}^6C_x) \times (0.15^x) \times ((1 - 0.15)^{(6-x)}))$$

Comes ready with Σ

put it by using "alpha"

6)

$$P(X \geq 4) = P(X = 4) + P(X = 5) + P(X = 6)$$

$$= \sum_{x=4}^6 (({}^6C_x) \times (0.15^x) \times ((1 - 0.15)^{(6-x)}))$$

From page 69 to page 70

"2) Poisson Distribution"

* X : the number of times an event occurs in an interval of time or space.

* λ : the mean (average) of the number of times an event occurs in an interval of time or space.

*The **probability mass function** or the **probability distribution** is

$$P(X = x) = f(x) = \frac{\lambda^x \times e^{-\lambda}}{x!}, \quad x = 0, 1, 2, 3, 4, \dots \dots \dots$$

- e is Euler's number ($e = 2.71828\dots$) and $x!$ is the factorial of x .
- The parameter of Poisson Distribution is λ
- $X \sim \text{Poisson}(\lambda)$
- The mean or the expected value is $\mu = \lambda$
- The variance is $\sigma^2 = \lambda$
- The standard deviation is $\sigma = \sqrt{\lambda}$

Note for example in page 65 to how put it in the calculator:

X : no. of snake bite cases in a year.

$\lambda = 6$: the mean (average) of no. of snake bite cases in a year.

$$P(X = x) = f(x) = \frac{6^x \times e^{-6}}{x!}$$

for $x = 0, 1, 2, 3, 4, 5, \dots \dots \dots$


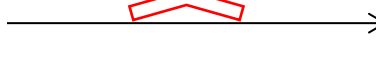
1)

$$\text{ii) } P(X < 2) = P(X = 0) + P(X = 1) = \sum_{x=0}^1 \left(\frac{6^x \times e^{-6}}{x!} \right)$$

2)

Y : no. of snake bite cases in 2 year.

$\lambda' = ?$: the mean (average) of no. of snake bite cases in 2 year.

X :	$\lambda = 6$		→ 1 year
Y :	$\lambda^* = ?$		→ 2 years

$$\Rightarrow \lambda^* \times 1 = 6 \times 2 \Rightarrow \lambda^* = 12$$



$$P(Y = y) = f(y) = \frac{12^y \times e^{-12}}{y!}$$

for $y = 0, 1, 2, 3, 4, 5, \dots \dots \dots$

3)

W : no. of snake bite cases in a month.

$\lambda'' = ?$: the mean (average) of no. of snake bite cases in a month.

X :	$\lambda = 6$		→ 1 year=12months
W :	$\lambda^{**} = ?$		→ 1 month

$$\Rightarrow \lambda^{**} = ? \times 12 = 6 \times 1 \Rightarrow \lambda^{**} = ? = \frac{6}{12} = \frac{1}{2}$$

$$P(W = w) = f(w) = \frac{\left(\frac{1}{2}\right)^w \times e^{-\left(\frac{1}{2}\right)}}{w!}$$

for $w = 0, 1, 2, 3, 4, 5, \dots \dots \dots$