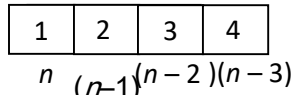


Number of Permutations without Repetition.

(1) Arranging n objects, taken r at a time equivalent to filling r places from n things

r -places:



Number of choices:

$$n \quad (n-1) \quad (n-2) \quad (n-3)$$

$$n - (r-1)$$

The number of ways of arranging = The number of ways of filling r places.

$$= n(n-1)(n-2)\dots(n-r+1) = \frac{n(n-1)(n-2)\dots(n-r+1)((n-r)!)}{(n-r)!} = \frac{n!}{(n-r)!} = {}^n P_r$$

(2) The number of arrangements of n different objects taken all at a time = ${}^n P_n = n!$

Note: ${}^n P_0 = \frac{n!}{n!} = 1$; ${}^n P_r = n \cdot {}^{n-1} P_{r-1}$

$$0! = 1; \frac{1}{(-r)!} = 0 \text{ or } (-r)! = \infty \quad (r \in \mathbb{N})$$