

# Derangement, Partial Derangement

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## 1 DEFINITION

A derangement is a permutation of the elements of a set, such that no element appears in its original position. [?]

## 2 NOTATION

The number of derangement of a set of size  $n$ , usually written  $D_n$ ,  $d_n$ , or  $!n$ , is called the "derangement number" or "de Montmort number". (These numbers are generalized to rencontres numbers). [?]

The number of derangements of an  $n$ -element set is called the  $n$ th derangement number or rencontres number, or the subfactorial of  $n$  and is sometimes denoted  $!n$  or  $D_n$

## 3 FORMULA DERANGEMENT

$$d_n = n! \sum_{i=0}^n \frac{(-1)^i}{i!}$$

## 4 FORMULA PARTIAL DERANGEMENT

La formula precedente è utilizzata quando vogliamo il numero delle permutazioni (o casi favorevoli, a volte negli esercizi) che hanno fixed point uguale a 0. In generale per  $k > 0$  dove  $k$  rappresenta il numero di fixed point, la formula diventa:

$$d_{n,k} = \frac{n!}{k!} \sum_{i=0}^n \frac{(-1)^i}{i!}$$

## 5 NOTE

In altre parole, il derangement è un sottoinsieme dell'insieme delle permutazioni formato dalle permutazioni che non hanno punti fissi, cioè in cui nessun elemento è al suo posto.

## 6 HISTORY

The problem of counting derangements was first considered by Pierre Raymond de Montmort in 1708; he solved it in 1713, as did Nicholas Bernoulli at about the same time. [?]

## 7 APPROFONDIMENTI

- WIKIPEDIA: Derangement
- DISPENSA: Derangement.pdf
- OEIS: Number of derangement