

The screenshot shows a software window titled 'Combinatory' with a menu bar (File, Info, Colour) and several calculation sections:

- Variations (Vm,n):**  $V$  m=8, n=3, result=336. Formula:  $m \cdot (m-1) \cdot \dots \cdot (m-n+1)$ . Label: Ordinary variations.
- Variations with repetition (VRm,n):**  $VR$  m=8, n=3, result=512. Formula:  $VR = m^n$ . Label: Variations with repetition.
- Permutations (Pn):**  $P$  n=8, result=40320. Formula:  $Pn = n!$ . Label: Permutations.
- Perm. with repetition (PR m,n1,n2...):**  $PR$  m=14, n=[dropdown: 8, 5, 1], result=18018. Formula:  $PR = \frac{m!}{n1! \cdot n2! \cdot \dots \cdot nk!}$ . Label: Permutations with repetition.
- Combinations:**  $C$  m=8, n=3, result=56. Formula:  $C = \frac{m!}{n! \cdot (m-n)!}$ . Label: Combinations.
- Combinations with repetition (CRm,n):**  $CR$  m=8, n=3, result=120. Formula:  $CR = \frac{(m+n-1)!}{n! \cdot (m-1)!}$ . Label: Combinations with repetition.
- Newton binomial:**  $(a+b)^n$  n=12, result=0k>. Formula:  $= \sum_{i=0}^n C_{n,i} \cdot a^{n-i} \cdot b^i$ . Label: Newton Binomial: combinatory numbers  $C_{n,i}$  of  $\sum C_{n,i} \cdot a^{n-i} \cdot b^i$ .

At the bottom, a text area displays the binomial expansion for  $(a+b)^{12}$ .

The image is quite self-explanatory: once introduced the values of m, n, etc. is obtained the result pressing the button " = ".

Only requires some comment the case:

### Permutations with repetition (PR):

**PR(m, n<sub>1</sub>, n<sub>2</sub>..n<sub>k</sub>)** is the number of groups of m elements ordering them in all the possible ways inside the subsets of n<sub>1</sub>... n<sub>k</sub> elements (n<sub>1</sub> +...+ n<sub>k</sub> = m)

The numbers n<sub>1</sub>... n<sub>k</sub> are introduced, one by one, in the stall with dropdown list and they are accepted with " return". they can be reedited and deleted selecting them in the list (Remember you that their sum must be = m)

