$n, r \in \mathbb{W}$.

Permutations:

$$P(n,r) = (n)_r = \frac{n!}{(n-r)!}, r \leq n \tag{1}$$

Combinations:

$$C(n,r) = \binom{n}{r} = \frac{P(n,r)}{r!} = \frac{n!}{r!(n-r)!} \tag{2}$$

Permutations w/ replacement (repeats in output):

$$P_R(n,r) = n^r, P_R(0,0) = 1 \tag{3}$$

Combinations w/ replacement (repeats in output):

$$C_R(n,r) = C(n+r-1,r) \tag{4}$$

Permutations of multisets (repeats in input):

$$P_M(n,x,y,z) = \binom{n}{x,y,z} = \frac{n!}{x!y!z!} \tag{5}$$

Circular permutations:

$$P_C(n) = (n-1)! \tag{6}$$

$$P(n,0) = 1$$

$$P(n,1) = n$$

$$P(n,n) = n!$$

$$P(n,n-1) = P(n,n)$$

$$C(n,n-r) = C(n,r)$$

k consecutive items:

$$P(n-k+1,r) \tag{7}$$

Count n minus k consecutive items, plus 1 representing the items as a group.

k items can't be together:

$$P(n-k,r) \cdot P(n-k+1,k) \tag{8}$$

Count all $n-k$ items without restriction. Then place k items in $n-k$ spaces after of each item, and 1 space before first item. Then the items

Table 1: Combinatorial Operations

Operation	Meaning
$+n$	Add n choices to an event
$-n$	Remove n choices from an event
$\times n$	Add an event with n choices
$\div n$	Remove an event with n choices