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### List of properties of combination

•

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

•

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

then  $r + r' = n$

•

$$C(n, r) + C(n, r - 1) = C(n + 1, r)$$

### Proof of property of combination as $C(n, r) = C(n, n-r)$

•

$$C(n, n - r) = \frac{n!}{(n - n + r)!(n - r)!} = C(n, r)$$

### Proof of property of combination as $C(n, r) = C(n, r')$ then $r + r' = n$

•

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

•

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

•

$$r = n - r'$$

•

$$r + r' = n$$

### Proof of property of combination as $C(n, r) + C(n, r-1) = C(n+1, r)$

•

$$C(n, r) = \frac{n!}{(n - r)!r!}$$

•

$$C(n, r - 1) = \frac{n!}{(n - r + 1)!(r - 1)!}$$

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•

$$C(n, r) + C(n, r - 1) = \frac{n!}{(n - r)!(r - 1)!} \left[ \frac{1}{r} + \frac{1}{n - r + 1} \right]$$

•

$$C(n, r) + C(n, r - 1) = \frac{n!}{(n - r)!(r - 1)!} \times \frac{n + 1}{r(n - r + 1)}$$

•

$$C(n, r) + C(n, r - 1) = \frac{(n + 1)!}{(n - r + 1)!r!} = C(n + 1, r)$$