MATH 130A Review: Factorials and Counting

Facts to Know

- Factorial

- $k$-Permutations of $n$-many distinct objects

- $k$-Combinations of $n$-many distinct objects

- The number of $k$-permutations of $n$-many distinct objects is

- The number of $k$-combinations of $n$-many distinct objects is
Examples

1. Let $k$ and $n$ be arbitrary natural numbers satisfying $0 < k < n$. Show that

- $\binom{0}{0} = \binom{n}{0} = \binom{n}{n} = 1$

- $\binom{n}{k} = \frac{n}{n-k} \binom{n-1}{k}$

- $\binom{n-1}{k} + \binom{n-1}{k-1} = \binom{n}{k}$
2. You have five digits (four fingers and one thumb) on one hand. You decide to pair two digits together. How many different combinations are there?
3. Count how many rearrangements of the letters of your first name there are. This is an easy task for those with first names that do not repeat letters.