MATC44 - Practice Problem Set 2

These problems are not for credit and should not be handed in. While working through these problems, be sure to provide ample justification (e.g., a proof, logical argument or counter-example)!

Topics include

- Combinatorial proofs
- Invariance proofs
- Game of Nim
- Other combinatorial games
- Stars and bars
- The binomial theorem

Combinatorial proofs

Q1. Derive a combinatorial identity by counting the number of ways to choose a non-empty subset of $\{1, 2, \ldots, n\}$. For the right side, partition based on the largest element of the subset (say k).