Pigeonhole Principle

**Pigeonhole Principle:** If we put $k + 1$ objects into $k$ boxes, then some box has at least 2 objects. More generally, if we put $m$ objects into $k$ boxes (where $m > k$), then some box has at least $\lceil \frac{m}{k} \rceil$ objects.

**Strong Pigeonhole Principle:** If we put $m_1 + m_2 + \ldots + m_n - n + 1$ objects into $n$ boxes, then there exists an $i \in \{1, 2, \ldots, n\}$ such that box $i$ has at least $m_i$ objects.