5. Consider the following setting.

There are n industingeuishable objects in a line and $k-1$ dividers to divide the objects into k groups. $x_1 \ldots x_k$ hence are equal to the number of objects in each group, which adds to n

Since we allow $x_1 \ldots x_k$ to be 0, there are $n+k-1$ locations to place these dividers as they can be placed at the beginning of the line

Hence, there are $\binom{n+k-1}{k-1}$ ways to place the dividers.

Hence there are $\binom{n+k-1}{k-1}$ ways to divide n objects into k ~~possil~~ groups.

It follows that there are $\binom{n+k-1}{k-1}$ ways to solve $x_1 + \cdots + x_k = n$