More about \( \binom{n+k-1}{k-1} \), counting plans for \( n \) books on \( k \) shelves.

1) In the textbook, they use a different formula:
\[
\begin{align*}
& n = \text{number of shelves} \\
& r = \text{number of books} \\
& \text{plans for shelves} = \binom{r+n-1}{r}
\end{align*}
\]

\{ Notice: this uses an identity which is always true \( \binom{n}{m} = \binom{n}{n-m} \) \}

\( \begin{align*}
\text{Ex: } & \binom{5}{2} = \binom{5}{3} = \frac{5!}{2!3!} = 10.
\end{align*} \)

2) This counting of plans for \( n \) books on \( k \) shelves works for other word problems too.

\( \text{Ex: How many ways can you choose 20 pastries from a bakery that sells 6 types?} \)

"Types" are like "shelves," and your choice of 20 is like a plan for 20.

\( \text{Answer: The important thing is to decide which number is the "types" or "shelves." That's the one to subtract 1 from and choose that many "dividers".} \)

\[
\begin{align*}
\binom{20 + 6 - 1}{6 - 1} &= \binom{25}{5} \\
&= \frac{53,130}{5!} = \frac{25!}{20!} \\
&= \frac{25 \cdot 24 \cdot 23 \cdot 22 \cdot 21}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}
\end{align*}
\]