Counting: Draw 5 cards without replacement from a 52 card deck, keep track of the order of selection of the cards.

\[
\frac{52 \text{ ways}}{\text{Card 1}} \quad \frac{51 \text{ ways}}{\text{card 2}} \quad \frac{50 \text{ ways}}{\text{Card 3}} \quad \frac{49 \text{ ways}}{\text{card 4}} \quad \frac{48 \text{ ways}}{\text{Card 5}}
\]

altogether \(^5\text{of ways (without replacement, keeping track of the order)}\)
to deal 5 cards out of 52 is \[\frac{(52)(51)(50)(49)(48)}{(47)(46)\cdots(1)}\]
\[= \frac{52!}{47!}\]

In general, if there are \(n\) items and we want to pick \(r\) of them without replacement, but keeping track of the order of selection, there are

\[
\frac{n}{\text{item 1}} \quad \frac{n-1}{\text{item 2}} \quad \frac{n-2}{\text{item 3}} \cdots \quad \frac{n-(r-1)=n-r+1}{\text{item } r}
\]

altogether there are

\[\frac{n\times(n-1)(n-2)\cdots(n-r+1)}{(n-r)\cdots(1)}\]
\[= \frac{n!}{(n-r)!}\]

ways to pick \(r\) out of \(n\) items without replacement, keeping track of the order of selection.