

Theorem. We have

$$\Delta n^{\underline{m}} = m \, n^{\underline{m-1}}.$$

Proof. By definition,

$$\begin{aligned} \Delta n^{\underline{m}} &= (n+1) \textcolor{blue}{n} \cdots \textcolor{blue}{(n-m+2)} \\ &\quad - \textcolor{blue}{n} \cdots \textcolor{blue}{(n-m+2)} (n-m+1) \\ &= m \textcolor{blue}{n} \cdots \textcolor{blue}{(n-m+2)} \end{aligned}$$