

$$\begin{aligned}
 \text{sdcg}@k(\vec{r}) &:= \sum_{i=1}^{\infty} r_i P_{\text{sdcg}@k}(i) \\
 &= \frac{1}{Z} \sum_{i=1}^k \frac{r_i}{\lg(i+1)}
 \end{aligned}$$