

**Question**

#68 Simplify the ratio of factorials YOU MUST SHOW AT LEAST TWO STEPS!

$$\frac{(n+2)!}{n!}$$

**Answer**

$$\text{Method 1 } \frac{(n+2)!}{n!} = \frac{(n+2)(n+1) \cdot n!}{n!} = \frac{(n+1)(n+1)}{1} \cdot \frac{n!}{n!} = (n+2)(n+1) = n^2 + 3n + 2$$

$$\begin{aligned} \text{Method 2 } \frac{(n+2)!}{n!} &= \frac{(n+2)(n+1)(n)(n-1)(n-2)\dots\dots\dots 2 \cdot 1}{(n)(n-1)(n-2)\dots\dots\dots 2 \cdot 1} \\ &= \frac{(n+2)(n+1)}{1} \cdot \frac{(n)(n-1)(n-2)\dots\dots\dots 2 \cdot 1}{(n)(n-1)(n-2)\dots\dots\dots 2 \cdot 1} = (n+2)(n+1) = n^2 + 3n + 2 \end{aligned}$$

**Question**

#69 Simplify the ratio of factorials YOU MUST SHOW AT LEAST TWO STEPS!

$$\frac{(2n-1)!}{(2n+1)!}$$

**Answer**

Method 1  $\frac{(2n-1)!}{(2n+1)!} = \frac{(2n-1)!}{(2n+1)(2n)(2n-1)!} = \frac{1}{(2n+1)(2n)} \cdot \frac{(2n-1)!}{(2n-1)!} = \frac{1}{(2n+1)(2n)} = \frac{1}{4n^2+2n}$

Method 2  $\frac{(2n-1)!}{(2n+1)!} = \frac{(2n-1)(2n-2) \cdot (2n-3) \dots \dots \dots 2 \cdot 1}{(2n+1)(2n)(2n-1)(2n-2) \cdot (2n-3) \dots \dots \dots 2 \cdot 1}$

$$= \frac{1}{(2n+1)(2n)} = \frac{1}{4n^2+2n}$$