

$$y = \frac{1 \cdot 3}{2 \cdot 2} \cdot \frac{2 \cdot 4}{3 \cdot 3} \cdot \frac{3 \cdot 5}{4 \cdot 4} \dots$$

$$\log y = \sum_{n=1}^{\infty} \log \frac{n(n+2)}{(n+1)^2}$$

for now - it is convergent

$$\log y = \sum_{n=1}^{\infty} (\log n + \log(n+2) - 2 \log(n+1))$$

$$= (\log 1 + \log 2 + \log 3 + \dots) + (\log 3 + \log 4 + \dots) - 2(\log 2 + \log 3 + \log 4 + \dots)$$

$$\Rightarrow \log 1 + \log 2 - 2 \log 2$$

$$\Rightarrow 0 - \log 2$$

$$y = e^{-\log 2} \Rightarrow \left[\frac{1}{2} \right] \text{ Thus convergent}$$