

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

$$\begin{aligned} \sum_{n=1}^{\infty} \frac{1}{n(n+1)} &= \sum_{n=1}^{\infty} \left(\frac{1}{n} - \frac{1}{n+1} \right) = \sum_{n=1}^{\infty} \frac{1}{n} - \sum_{n=1}^{\infty} \frac{1}{n+1} \\ &= \sum_{n=1}^{\infty} \frac{1}{n} - \sum_{n=2}^{\infty} \frac{1}{n} = 1 - \lim_{n \rightarrow \infty} \frac{1}{n+1} = 1 - 0 = 1 \end{aligned}$$

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