$$\sum_{n=1}^{\infty}\left(\frac{1}{n}-\frac{1}{n+2}\right)$$

Not needed

Let's find the first few terms:

$$= \underbrace{\left(\frac{1}{1}-\frac{1}{3}\right)}_{n=1}+\underbrace{\left(\frac{1}{2}-\frac{1}{4}\right)}_{n=2}+\underbrace{\left(\frac{1}{3}-\frac{1}{5}\right)}_{n=3}+\underbrace{\left(\frac{1}{4}-\frac{1}{6}\right)}_{n=4}+\cdots$$

Consider the Nth partial sum, S_N (the sum of first N terms)

$$S_N = \left(\frac{1}{1}-\cancel{\frac{1}{3}}\right)+\left(\frac{1}{2}-\cancel{\frac{1}{4}}\right)+\left(\cancel{\frac{1}{3}}-\frac{1}{5}\right)+\left(\cancel{\frac{1}{4}}-\cancel{\frac{1}{6}}\right)+\cdots$$

$$\cdots+\underbrace{\left(\cancel{\frac{1}{N-2}}-\cancel{\frac{1}{N}}\right)}_{n=N-2}+\underbrace{\left(\cancel{\frac{1}{N-1}}-\frac{1}{N+1}\right)}_{n=N-1}+\underbrace{\left(\cancel{\frac{1}{N}}-\frac{1}{N+2}\right)}_{n=N}$$

$$=\frac{1}{1}+\frac{1}{2}-\frac{1}{N+1}-\frac{1}{N+2}$$ (you may want to write more terms to see this)

Nth partial sum test:

$$\lim_{N\to\infty} S_N = \lim_{N\to\infty}\left(\frac{1}{1}+\frac{1}{2}-\frac{1}{N+1}-\frac{1}{N+2}\right)$$

$$=\frac{1}{1}+\frac{1}{2}-0-0=\frac{3}{2}.$$

The series converges, and the sum is $\frac{3}{2}$.