- DOES $\sum_{n=0}^{\infty} \frac{2^{n+2}}{(\sqrt{5})^n}$ CONVERGE OR DIVERGE? IF CONV, FIND SUM.

$$\sum_{n=0}^{\infty} \frac{2^{n+2}}{(\sqrt{5})^n} = 4 \cdot \sum_{n=0}^{\infty} \left(\frac{2}{\sqrt{5}}\right)^n$$

THIS CONVERGES, SINCE IT IS A GEOMETRIC SERIES WITH RATIO $\frac{2}{\sqrt{5}}$, WHICH IS LESS THAN 1.

THE SUM IS $\dfrac{4}{1 - 2/\sqrt{5}} = \dfrac{4\sqrt{5}}{\sqrt{5} - 2}$

- DOES $\sum_{n=1}^{\infty} \left(\frac{1}{\sqrt{n}} - \frac{1}{\sqrt{n+1}}\right)$ CONVERGE? IF SO, FIND SUM.

ITS A TELESCOPING SERIES

$$\sum_{n=1}^{\infty} \left(\frac{1}{\sqrt{n}} - \frac{1}{\sqrt{n+1}}\right) = \left(1 - \cancel{\frac{1}{\sqrt{2}}}\right) + \left(\cancel{\frac{1}{\sqrt{2}}} - \cancel{\frac{1}{\sqrt{3}}}\right) + \left(\cancel{\frac{1}{\sqrt{3}}} - \cancel{\frac{1}{\sqrt{4}}}\right) + \cancel{\cdots}$$

$$= 1$$

(MORE FORMALLY, $S_n = 1 - \frac{1}{\sqrt{n}}$

$\lim_{n \to \infty} S_n = 1$, SO SUM IS 1)