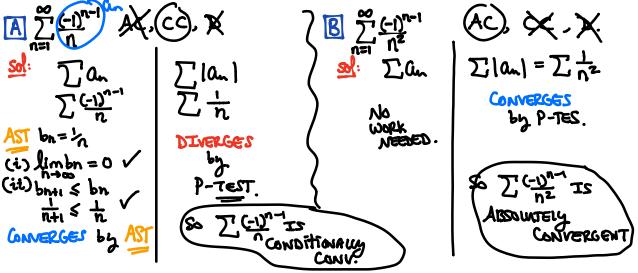
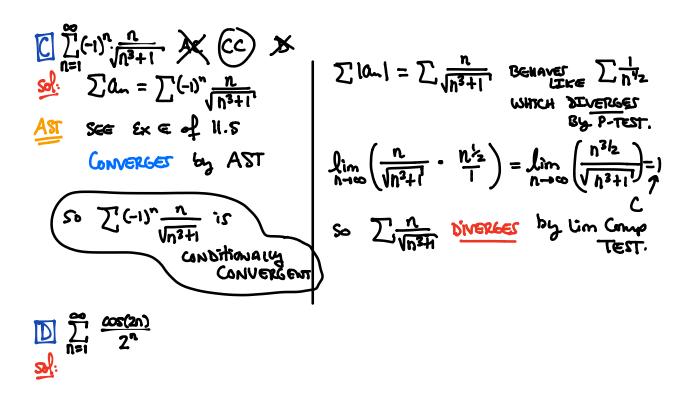
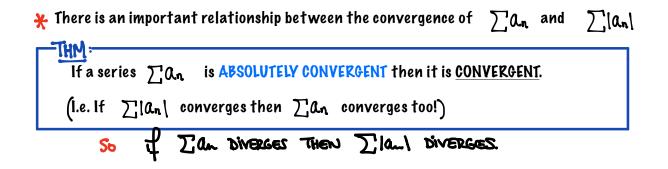


Note that if the series has all positive terms then  $|a_n|=a_n$  so absolute convergence is the same as convergence in this case.

Ex. I. Determine if the following series are ABSOLUTELY CONVERGENT, CONDITIONALLY CONVERGENT, or DIVERGENT.







PART 2: THE RATIFED TRES Geo & AST. \* Currently, we only have one test for convergence that applies to series with positive and negative terms. We will now learn a second one, called the RATIO TEST! This test is very useful in determining if a series is absolutely convergent. THM : [THE RAILO TEST] lim <u>1907+11 = L</u> Given the series  $\sum Q_n$ . if: **n→∞** [an] L < ۱ میں L > 1 L = 1Za 15 Zia TS WE KNOW ABSOLUTELY, CONVERGENT DIVERGENT.

Ex2. Use the RATIO TEST to determine if each series is ABSOLUTELY CONVERGENT  
CONDITIONALLY CONVERGENT, or PIVERGENT  

$$\begin{bmatrix}
\sum_{n=1}^{\infty} \frac{G^n}{n^2} & |d_n| = \frac{G^n}{n^2} & |a_{n+1}| = \frac{G^{n+1}}{(n+1)^2} \\
\begin{bmatrix}
\sum_{n=1}^{\infty} \frac{1}{n^2} & |d_n| = \frac{G^n}{n^2} & |a_{n+1}| = \frac{G^{n+1}}{(n+1)^2} \\
\begin{bmatrix}
\sum_{n=1}^{\infty} \frac{1}{n^2} & |a_n| = \frac{G^n}{n^2} & |a_{n+1}| = \frac{G^{n+1}}{(n+1)^2} \\
\end{bmatrix}$$

$$\begin{bmatrix}
\sum_{n=1}^{\infty} \frac{G^n}{n^2} & |a_n| = \frac{G^n}{n^2} & |a_{n+1}| = \frac{G^{n+1}}{(n+1)^2} \\
\end{bmatrix}$$

$$\begin{bmatrix}
\sum_{n=1}^{\infty} \frac{G^n}{n^2} & |a_n| = \frac{G^n}{n^2} & |a_{n+1}| = \frac{G^{n+1}}{(n+1)^2} \\
\end{bmatrix}$$

$$\begin{bmatrix}
\sum_{n=1}^{\infty} \frac{G^n}{n^2} & |a_{n+1}| = \frac{G^{n+1}}{(n+1)^2} \\
\end{bmatrix}$$

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\sum_{n=1}^{\infty} \frac{G^n}{n^2} & |a_{n+1}| = \frac{G^{n+1}}{(n+1)^2} \\
\end{bmatrix}$$

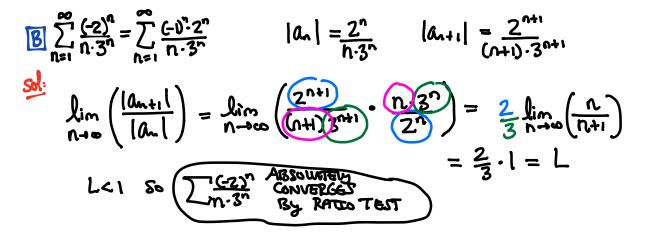
$$\begin{bmatrix}
\sum_{n=1}^{\infty} \frac{G^n}{n^2} & |a_{n+1}| = \frac{G^{n+1}}{(n+1)^2} \\
\end{bmatrix}$$

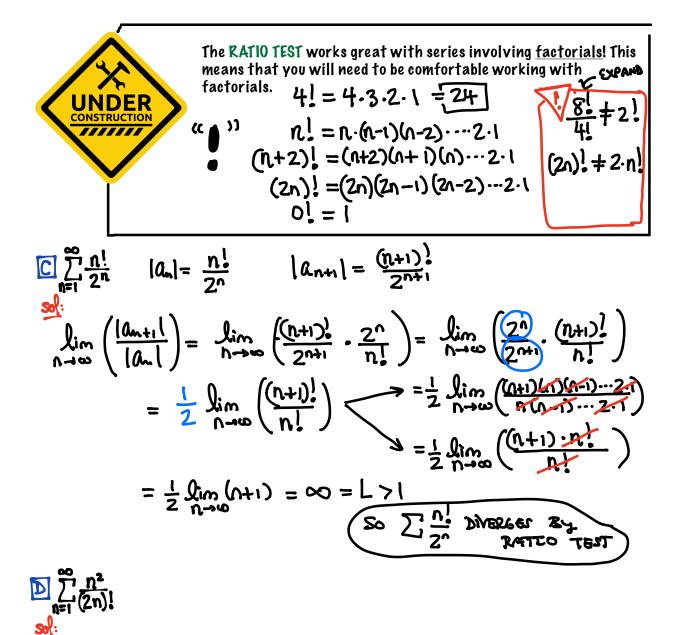
$$\begin{bmatrix}
\sum_{n=1}^{\infty} \frac{G^n}{n^2} & |a_{n+1}| = \frac{G^{n+1}}{(n+1)^2} \\
\end{bmatrix}$$

$$\begin{bmatrix}
\sum_{n=1}^{\infty} \frac{G^n}{n^2} & |a_{n+1}| = \frac{G^{n+1}}{(n+1)^2} \\
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\sum_{n=1}^{\infty} \frac{G^n}{n^2} & |a_{n+1}| = \frac{G^{n+1}}{(n+1)^2} \\
\end{bmatrix}$$

$$\begin{bmatrix}
\sum_{n=1}^{\infty} \frac{G^n}{n^2} & |a_{n+1}| = \frac{G^{n+1}}{(n+1)^2} \\
\end{bmatrix}$$





$$\sum_{n=1}^{\infty} \frac{(2n)!}{(n!)^{2}} \quad |a_{n}| = \frac{(2n)!}{(n!)^{2}} \quad |a_{n+1}| = \frac{(2(n+i))!}{((n+i)!)^{2}} = \frac{(2n+2)!}{((n+i)!)^{2}}$$

$$\lim_{n \to \infty} \left( \frac{|a_{n+1}|}{|a_{n}|} \right) = \lim_{n \to \infty} \left( \frac{(2n+2)!}{((n+i)!)^{2}} \cdot \frac{(n!)^{2}}{(2n)!} \right)$$

$$= \lim_{n \to \infty} \left( \frac{(2n+2)!}{(2n+1)!} \cdot \frac{(n!)!}{(2n)!} \cdot \frac{(n!)!}{(2n)!} \right)$$

$$= \lim_{n \to \infty} \left( \frac{(2n+2)!}{(2n)!} \cdot \frac{(n!)!}{(2n)!} \cdot \frac{(n!)!}{(2n)!} \cdot \frac{(n!)!}{(2n)!} \right)$$

$$= \lim_{n \to \infty} \left( \frac{(2n+2)!}{(2n)!} \cdot \frac{(n!)!}{(n+1)!} \right) = \lim_{n \to \infty} \left( \frac{(2n+2)!}{(2n)!} \cdot \frac{(n+1)!}{(2n)!} \right)$$

$$= \lim_{n \to \infty} \left( \frac{(2n+2)!}{(2n)!} \cdot \frac{(2n+1)!}{(2n)!} \cdot \frac{(2n+1)!}{(2n)!} \right) = \lim_{n \to \infty} \left( \frac{(2n+2)!}{(n^{2}+(2n+1)!)} \right)$$

$$\sum_{n \to \infty} \left( \frac{(2n+2)!}{(2n)!} \cdot \frac{(2n+2)!}{(2n)!} \cdot \frac{(2n+2)!}{(2n)!} \right) = \lim_{n \to \infty} \left( \frac{(2n+2)!}{(2n)!} \cdot \frac{(2n+2)!}{(2n)!} \right)$$

$$= \lim_{n \to \infty} \left( \frac{(2n+2)!}{(2n)!} \cdot \frac{(2n+2)!}{(2n)!} \cdot \frac{(2n+2)!}{(2n)!} \right) = \lim_{n \to \infty} \left( \frac{(2n+2)!}{(2n)!} \cdot \frac{(2n+2)!}{(2n)!} \right)$$

$$= \lim_{n \to \infty} \left( \frac{(2n+2)!}{(2n)!} \cdot \frac{(2n+2)!}{(2n)!} \cdot \frac{(2n+2)!}{(2n)!} \right) = \lim_{n \to \infty} \left( \frac{(2n+2)!}{(2n)!} \cdot \frac{(2n+2)!}{(2n)!} \right)$$

$$= \lim_{n \to \infty} \left( \frac{(2n+2)!}{(2n)!} \cdot \frac{(2n+2)!}{(2n)!} \cdot \frac{(2n+2)!}{(2n)!} \right) = \lim_{n \to \infty} \left( \frac{(2n+2)!}{(2n)!} \cdot \frac{(2n+2)!}{(2n)!} \right)$$

