Alternating series · series that her positive & negative herms  $E_{x}$ .  $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n} = 1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4}$ expressed for . . Deb: 2 (-1) Un , Un >0  $= U_1 - U_2 + U_3 - U_4 + \cdots$ · Alternating series hestis Converge If:  $\leq (-1)^{n+1} U_n$ 1- Un ≥0  $2-\mathcal{U}_{m+1} \leq \mathcal{U}_m \quad \forall n \geq N \quad \text{non inoceasing}$ 3- lim Un =0 Note:  $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n!}$  is an Alternat if not -> No into · Alternating series Estimation Theorem That Converges  $1 = \frac{\sum_{n=1}^{\infty} (-1)^{n+1} V_n}{\sum_{n=1}^{\infty} (-1)^n U_n}$  Converges then  $S_n = U_n - U_2 + U_3 + \dots + (-1)^n U_n$ approximates L= Sum with error E= L-Sin | E | < | Un+1 | → Sign (E) = Sign (-1)" Un+1 - ine first unused Example: Estimate the sum of team first 8 berns of the series  $\frac{2}{2n} \left(-1\right)^n$ The first & terms: so the girst curused term is the 9th term  $= 1 - \frac{1}{2} + \frac{1}{4}$ Maa Etaiwi

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