$$\underbrace{\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\sqrt[3]{n^2}}}$$

Absolutely convergent?
Conditionally convergent?

$$\sum_{n=1}^{\infty} \frac{1}{n^{\frac{2}{3}}}$$ divergent p-series

$\rightarrow$ decreasing? Goes to zero?

Converges conditionally.

$$\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\sqrt[3]{n^2}}$$

$$\sum_{n=1}^{\infty} \left| \frac{(-1)^{n+1}}{\sqrt[3]{n^2}} \right| = \sum_{n=1}^{\infty} \frac{1}{n^{\frac{2}{3}}} \text{ diverges, } p < 1$$

$a_n = \frac{1}{n^{\frac{2}{3}}}$ Decreasing? Show $a_{n+1} \leq a_n$ $\quad n+1 \geq n$

$$(n+1)^2 \geq n^2$$

$$\lim_{n\to\infty} \frac{1}{n^{\frac{2}{3}}} = 0 \qquad \sqrt[3]{(n+1)^2} \geq \sqrt[3]{n^2}$$

$\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\sqrt[3]{n^2}}$ is conditionally convergent $\quad \frac{1}{\sqrt[3]{(n+1)^2}} \leq \frac{1}{\sqrt[3]{n^2}}$

$$-1^n = -1$$

$(-1)^n$ is alternating

$$\frac{n(n+1)}{n^2(n+2)} \to \frac{1}{n} \text{ as } n \to \infty$$

$$\sum_{n=1}^{\infty} \frac{2^n n^2}{3^n}$$

$$(n^2)^{\frac{1}{n}}$$

$$n^{\frac{1}{n}} \to 1$$

as $n \to \infty$

$$\lim_{n\to\infty} \sqrt[n]{\frac{2^n n^2}{3^n}} = \lim_{n\to\infty} \frac{2\sqrt[n]{n^2}}{3}$$

$$= \lim_{n\to\infty} \frac{2\left(n^{\frac{1}{n}}\right)^2}{3} = \frac{2}{3}$$

$$\sum_{n=0}^{\infty} \frac{n!\,10^n}{(2n)!}$$

$$\frac{a_{n+1}}{a_n} = \frac{\frac{(n+1)!\,10^{n+1}}{(2(n+1))!}}{\frac{n!\,10^n}{(2n)!}} = \frac{(n+1)\cancel{!}\,10^{\cancel{n+1}}}{(2n+2)!} \cdot \frac{(2n)!}{\cancel{n!}\,\cancel{10^n}}$$

$(2n+2)(2n+1)(2n)(2n-1)\cdots$

$$= \frac{10(n+1)}{(2n+2)(2n+1)}$$

$$\lim_{n\to\infty} \frac{a_{n+1}}{a_n} = \lim_{n\to\infty} \frac{10(n+1)}{(2n+2)(2n+1)} = \lim_{n\to\infty} \frac{10n}{(2n)^2} = \lim_{n\to\infty} \frac{5}{2n} = 0$$

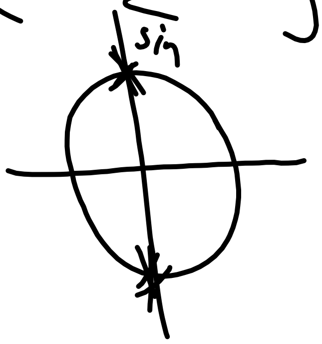
$1,2 << n$ alg

The series converges.

$$\sum_{n=1}^{\infty} \frac{\sin\frac{(2n-1)\pi}{2}}{n^2} \qquad \sum_{n=1}^{\infty} \frac{\sin n}{n^2}$$

$$\left\{\sin\frac{(2n-1)\pi}{2}\right\}_{n=1}^{\infty} = 1, -1,$$

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



$$\sum_{n=1}^{\infty} \underbrace{\frac{\sin n}{n^2}}_{\text{not pos}}$$

$$\sum_{n=1}^{\infty} \left| \frac{\sin n}{n^2} \right| \leq \sum_{n=1}^{\infty} \frac{1}{n^2} \text{ converges, } p = 2$$

$$\sum_{n=1}^{\infty} \frac{\sin n}{n^2} \text{ is abs convergent}$$