$$\sum \Big| \underbrace{e^{\frac{1}{\sqrt{n}}} - \sin\frac{1}{\sqrt{n}} - 1}_{a_n} \Big|$$

$x_n = \frac{1}{\sqrt{n}}$ $\qquad \frac{1}{\sqrt{n}} \to 0$

$$f(x) = e^x - \sin x - 1$$

$$= \cancel{1} + \cancel{x} + \frac{x^2}{2} + o(x^2) - \left(\cancel{x} - \frac{x^3}{6} + o(x^4)\right) - \cancel{1}$$

$$= \frac{x^2}{2} + o(x^2) - \frac{x^3}{6} + o(x^4)$$

$$\approx \frac{x^2}{2} + o(x^2)$$

$a_n \approx \dfrac{\left(\frac{1}{\sqrt{n}}\right)^2}{2}$ $\qquad \frac{1}{n} = b_n$ $\qquad$ LSK

$$\lim_{n\to\infty} \frac{|a_n|}{b_n} = \lim \frac{\left|e^{\frac{1}{\sqrt{n}}} - \sin\frac{1}{\sqrt{n}} - 1\right|}{\frac{1}{n}} = \frac{1}{2} \in (0,\infty)$$

Heine $\quad x_n = \frac{1}{\sqrt{n}}$

$$\lim_{x\to 0} \frac{|e^x - \sin x - 1|}{x^2} \stackrel{?}{=} \frac{1}{2}$$

$$\lim_{x\to 0} \frac{\frac{x^2}{2} + o(x^2)}{x^2} = \frac{1}{2} + 0$$

$$\sum b_n \text{ D} \implies \boxed{\sum |a_n| \text{ D}}$$

$\ln \frac{1}{n^3}$ $\qquad x_n = \frac{1}{n^3}$ $\qquad x_n \to 0$

$$\ln(1+x) = x$$

$$1 + \underbrace{(x-1)}_{\to -1} \; ?$$

$$\ln\left(\sin x \cdot \frac{1}{x}\right)$$

$$1 \underbrace{- \frac{x^2}{6} + o(x^3)}$$

$$\lim_{x \to 0} \frac{o(x^4)}{x^4} = 0$$

$$\lim_{x \to 0} \underbrace{\frac{o(x^4)}{x^3 \cdot x}}_{0} \cdot \underbrace{x}_{0} = 0 \quad \checkmark$$