37 $\displaystyle\sum_{n=2}^{\infty} \frac{n^3}{\sqrt{n^7 - 2n^2 + 1}}$ $\quad \dfrac{1}{\sqrt{n}}$

$$\frac{\dfrac{1}{\sqrt{n}}}{\dfrac{n^3}{\sqrt{n^7-2n^2+1}}} = \frac{\sqrt{n^7-2n^2+1}}{\sqrt{n^7}}$$

$$\sqrt{1 - \frac{2}{n^5} + \frac{1}{n^7}} \to 1$$

Σ diverges by LCT

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63 $\displaystyle\sum_{n=1}^{\infty} \frac{\tan^{-1} n}{n^2} = \frac{\tan^{-1} 1}{1} + \frac{\tan^{-1} 2}{4} + \frac{\tan^{-1} 3}{9} + \cdots$

$\displaystyle\frac{\tan^{-1} n}{n^2} < 2 \sum \frac{1}{n^2}$ converges by Comparison Test

$\displaystyle\lim_{n \to \infty} \tan^{-1} n = \frac{\pi}{2}$

OR USE L.C.T.

$$\lim_{n \to \infty} \frac{\frac{1}{n^2}}{\frac{\tan^{-1} n}{n^2}} = \frac{1}{\tan^{-1} n} \to \frac{1}{\frac{\pi}{2}}$$

✓