

"L'Hôpital"

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$$\lim_{n \rightarrow 1} \frac{\epsilon n^2 - \sqrt{n} + 1}{2n^2 - \sqrt{n} + 1} = \frac{\epsilon \cdot 2 + 1}{2 - 1 + 1} = \frac{2\epsilon + 1}{2} \xrightarrow{\text{L'Hôpital}} \frac{\Delta n - \sqrt{n}}{1 \cdot n - 1} \Rightarrow \frac{\Delta - \sqrt{n}}{1 - 1} = \frac{1}{2}$$

$$\lim_{n \rightarrow 0} \frac{|n-1| - |n+1|}{n} = \frac{0}{0} \xrightarrow{\text{L'Hôpital}} \frac{-1}{1} = -1 \quad \left(n < \frac{1}{2} \Rightarrow f(n) = \frac{4n}{n} = 4 \right)$$

$$\lim_{n \rightarrow \infty} \frac{n - \epsilon}{\sqrt{n} - 1} = \frac{\infty}{\infty} \rightarrow \frac{1}{\frac{1}{2\sqrt{n}}} = 2\sqrt{n} \rightarrow \infty$$

$$\lim_{n \rightarrow 2} \frac{n - \sqrt{n}}{2n^2 - n - 4} = \frac{0}{0} \xrightarrow{\text{L'Hôpital}} \frac{1 - \frac{1}{2\sqrt{n}}}{4n - 1} = \frac{1 - \frac{1}{2}}{8 - 1} = \frac{\frac{1}{2}}{7} = \frac{1}{14}$$

$$\lim_{n \rightarrow 1} \frac{1 - \sqrt{n}}{1 - \sqrt{5-n}} = \frac{0}{0} \xrightarrow{\text{L'Hôpital}} \frac{-\frac{1}{2\sqrt{n}}}{-\frac{1}{2\sqrt{5-n}}} = \frac{-\frac{1}{2}}{-\frac{1}{2}} = 1$$

$$\lim_{n \rightarrow \infty} \frac{\sqrt[3]{n+1} - \epsilon}{\sqrt[3]{2n+1} - \sqrt[3]{n}} = \frac{\infty}{\infty} \xrightarrow{\text{L'Hôpital}} \frac{\frac{1}{3\sqrt[3]{n+1}}}{\frac{1}{3\sqrt[3]{2n+1}} - \frac{1}{3\sqrt[3]{n}}} = \frac{\frac{1}{3}}{\frac{1}{3} - \frac{1}{3}} = \frac{1}{0} = \infty$$

$$\lim_{n \rightarrow 1} \frac{\sqrt{n} + \sqrt{n+1} - 1}{\sqrt{n} - 1} = \frac{0}{0} \xrightarrow{\text{L'Hôpital}} \frac{\frac{1}{2\sqrt{n}} + \frac{1}{2\sqrt{n+1}}}{\frac{1}{2\sqrt{n}}} = \frac{\frac{1}{2} + \frac{1}{2}}{1} = 1$$

$$\lim_{n \rightarrow \pi} \frac{1 + \cos^n n}{\sin^n n} \approx \frac{0}{0} \rightarrow \frac{\cos^n n - \sin^n n}{\sin^n n - \cos^n n} \approx \frac{\cos^n n - \sin^n n}{\cos^n n (\sin^n n - \cos^n n)} \approx \frac{1}{\cos^n n}$$

\Rightarrow

$$\lim_{n \rightarrow \pi} \frac{1 + \cos^n n}{\sin^n n} \approx \frac{0}{0} \rightarrow \frac{(1 + \cos^n n)(\cos^n n - \cos^n n + 1)}{(1 - \cos^n n)(1 + \cos^n n)} \approx$$

$$\frac{\cos^n n - \cos^n n + 1}{1 - \cos^n n} \Rightarrow \frac{\cos^n \pi - \cos^n \pi + 1}{1 - \cos^n \pi} = \frac{1 + 1 + 1}{1 - (-1)} = \frac{3}{2}$$

$$\lim_{n \rightarrow \pi} \frac{1 - \tan^n n}{\sin^n n - \cos^n n} \rightarrow \frac{1 - \tan^n \frac{\pi}{2}}{\sin^n \frac{\pi}{2} - \cos^n \frac{\pi}{2}} \approx \frac{0}{0} \xrightarrow{\text{L'H}} \frac{\cos^n n - \sin^n n}{\sin^n n - \cos^n n} \approx$$

$$\frac{\cos^n n - \sin^n n}{\cos^n n (\sin^n n - \cos^n n)} \approx \frac{1}{\cos^n n}$$

$$\lim_{n \rightarrow \frac{\pi}{2}} \frac{\tan^n n - 1}{\cos^n n} \rightarrow \frac{\tan^n \frac{\pi}{2} - 1}{\cos^n \left(\frac{\pi}{2}\right)} \approx \frac{0}{0} \xrightarrow{\text{L'H}} \frac{\sin^n n - \cos^n n}{\cos^n n (\cos^n n - \sin^n n)} \approx$$

$$\frac{\sin^n n - \cos^n n}{\cos^n n (\cos^n n - \sin^n n)} \approx \frac{1}{\cos^n n}$$