Mock TD test

Lesson

Give an accurate statement of the nth-term test for divergence of series, the convergence rule for Riemann series, the comparison rules for series of positive terms, the ratio test (d'Alembert's test) and the root test (Cauchy's test).

Exercise 1

— Using Cauchy's root test, determine the nature of the series $\sum \dfrac{n^{\alpha}}{\alpha^{n}}$ depending on the values of $\alpha \in \mathbb{R}_{+}^{*}$

— Determine the nature of the series $\sum \dfrac{\sin(\beta n)}{n^{2}}$ depending on the values of $\beta \in \mathbb{R}$

Exercise 2

Determine $\displaystyle \lim_{n \longrightarrow +\infty} \dfrac{\cos\left(\frac{1}{n}\right) - \frac{n^{2}}{n^{2}+1}}{\ln(n^{2}+1) - \ln(n^{2})}$

Exercise 3

Using a Taylor expansion, determine the nature of $\displaystyle \sum n \sin\left(\dfrac{1}{n}\right) - \cos\left(\dfrac{1}{n}\right)$.