Series of exercises N 4

Exercise 1

Study the nature of numerical series with general term u_n and calculate their sum

❶ $u_n = \dfrac{1}{(n+1)(n+2)}, \quad n \geq 0.$

❷ $u_n = \ln(1 + \frac{1}{n}), \quad n \geq 1.$

❸ $u_n = \dfrac{n^2 - 1}{n - 1}, \quad n > 1.$

Exercise 2

Study the nature of the following numerical series

❶ $\displaystyle\sum_{n \geq 1} \dfrac{n}{2^n}.$

❷ $\displaystyle\sum_{n \geq 1} \left(a + \dfrac{1}{n}\right)^n, \quad a > 0.$

❸ $\displaystyle\sum_{n \geq 1} \dfrac{1}{\sqrt{n}(n + 1)}.$

❹ $\displaystyle\sum_{n \geq 0} \dfrac{\cos^2(n)}{2^n}.$