

Ex. 1 Check the convergence of series: a) $\sum_{n=1}^{\infty} \frac{3n+2}{n^4+n+1}$ (use comparison test), b) $\sum_{n=1}^{\infty} \frac{2^n}{n^2}$.

Ex. 2 Calculate the double integral $\iint_D \frac{1}{\sqrt{x^2+y^2}} dx dy$, where $D = \{(x, y) : 1 \leq x^2 + y^2 \leq 4\}$.

Ex. 3 Find the general solution of differential equation: $y' + \frac{y}{x} = x^2 + 1$.

Ex. 4 Evaluate the integral $\iiint_V x^2 + y^2 + z^2 dx dy dz$, where $V = \{(x, y, z) : x^2 + y^2 \leq 4, 0 \leq z \leq 1\}$.

Ex. 5 Describe the procedure of searching for local extreme values of a function $f : \mathbf{R}^2 \rightarrow \mathbf{R}$, which has continuous partial derivatives up to the second order.