University of Oum ELBouaghi 2024-2025

Department of S. N. V. — Maths-Stat

Serie n° 2

Exercise 1: Evaluate the following integrals.

1/ $\int_{-2}^{-1} \frac{dx}{\sqrt{2-5x}}$, $\int_{0}^{1} \frac{x}{\sqrt{4x+5}}$, $\int_{1}^{3} x\sqrt{x-1}\,dx$ (changement variable).

2°/ $\int x^2 \ln(x)\,dx$, $\int \left(\frac{\ln(x)}{x}\right)^2 dx$, $\int x^2 \sin(4x)\,dx$ (by part).

Exercise 2: Study The Convergence of The following Series:

① $\sum_{n\geq 1} \frac{1}{n!}$, ② $\sum_{n\geq 1} \frac{1}{n^n}$, ③ $\sum_{n\geq 0} \frac{2n+3}{n+1}$, ④ $\sum_{n\geq 1} (-1)^n$

⑤ $\sum_{n\geq 1} \sin\left(\frac{1}{n^2}\right)$, ⑥ $\sum_{n\geq 1} \ln(n)$, ⑦ $\sum_{n\geq 1} \frac{2^{n+1}}{3^n}$.

Exercise 3: Calculate the partial derivatives of each function:

① $f(x,y) = \tan(xy) + y$, ② $f(x,y) = \frac{x+y}{1+x^2y}$.

③ $f(x,y,z) = e^{x+y+z}\ln\left(\frac{xz}{y}\right)$, ④ $f(x,y) = \sqrt{x+y-1}$.