Mohamed Khider University of Biskra

Faculty of Exact Sciences
Department of SM
University Year 2025/2026

Module: Series and Diff. Eq
Level: 2^{nd} Year LMD
Specialty: Physics

Dirigated Work N°2

(DOUBLE AND TRIPLE INTEGRALS)

Exercise 1 *Calculate the following integrals:*

$$\int_3^4\int_1^2 \frac{dxdy}{(x+y)^2}, \qquad \int_1^2\int_x^{x\sqrt{3}} xydxdy, \qquad \int_0^{2\pi}\int_{2\sin\theta}^{2} rdrd\theta, \qquad \int_0^1\int_{y-1}^{2y} xydxdy.$$

Exercise 2 *Define the integration limits for* $\iint_D f(x,y)dxdy$, D *being delimited by:*

a) $x=2, x=3, y=-1, y=5$ *b)* $y=0, y=1-x^2$

c) $x^2+y^2=4$ *d)* $y=\frac{2}{1+x^2}, y=x^2$

Exercise 3 *Calculate the following integrals:*

a) $\iint_D |x+y|\,dxdy$, *for* $D=\{(x,y)\in\mathbb{R}^2/\,|x|<1,|y|<1\}$.

b) $\iint_D \frac{1}{1+x^2+y^2}dxdy$, *for* $D=\{(x,y)\in\mathbb{R}^2/x^2+y^2<1\}$.

c) $\iint_D \frac{xy}{x^2+y^2}dxdy$, *for* $D=\{(x,y)\in\mathbb{R}^2/x>0,y>0,x+y<1\}$.

d) $\iint_D \sqrt{x^2+y^2}dxdy$, *for* $D=\{(x,y)\in\mathbb{R}^2/0<y<x<1\}$.

Exercise 4 *Calculate the area of the figure bounded by the curves:*

a) $D=\{(x,y)\in\mathbb{R}^2/y^2=2x, y=x\}$

b) $D=\{(x,y)\in\mathbb{R}^2/y=\sin x, y=\cos x, x=0\}$

c) $D=\{(x,y)\in\mathbb{R}^2/y^2=4x, x+y=3, y\geq 0\}$

d) $D=\{(x,y)\in\mathbb{R}^2/y^2=4x+4, y^2=-4x+4\}$

Exercise 5 *Calculate the volume bounded by the surfaces:*

a) $V=\{(x,y,z)\in\mathbb{R}^3/0\leq x\leq 1, 0\leq y\leq 1, 0\leq z\leq 1\}$ *(Volume of a cube)*

b) $V=\{(x,y,z)\in\mathbb{R}^3/x^2+y^2\leq R^2, 0\leq z\leq h\}$ *(Volume of a cylinder)*

c) $V=\{(x,y,z)\in\mathbb{R}^3/x^2+y^2+z^2\leq R^2\}$ *(Volume of a sphere)*

Charged of courses

Dr. OUAAR, F