Babeş-Bolyai University, Faculty of Mathematics and Computer Science
Computer Science Groups 911-917, Academic Year 2021-2022

Mathematical Analysis
Exercise Sheet 8

37. Compute the following integrals:

a) $\iint_A \frac{x}{x^2+y^2}\,dx\,dy$, where $A=[1,2]\times[0,1]$.

b) $\iint_A \frac{xy^2}{x^2+1}\,dx\,dy$, where $A=[1,2]\times[-3,3]$.

c) $\iint_A (\sin x+\sin y)\,dx\,dy$, where $A=[0,\pi/2]\times[0,\pi/4]$.

d) $\int\cdots\int_A e^{x_1+\cdots+x_n}\,dx_1\ldots dx_n$, where $A=[0,1]\times\cdots\times[0,1]$

HW 38. Compute the following integrals:

a) $\iint_A \frac{1}{(x+y)^2}\,dx\,dy$, where $A=[3,4]\times[1,2]$.

b) $\iint_A \frac{1}{x^2+y^2}\,dx\,dy$, where $A=[1/a,a]\times[0,1]$ with $a>1$.

c) $\iint_A \min\{x,y\}\,dx\,dy$, where $A=[0,1]\times[0,1]$.

d) $\iiint_A \frac{x^2z^3}{1+y^2}\,dx\,dy\,dz$, where $A=[-1,0]\times[-1,1]\times[0,1]$.

e) $\iiint_A \frac{1}{(x+y+z)^3}\,dx\,dy\,dz$, where $A=[1,a]\times[1,a]\times[1,a]$ with $a>1$.

39. Let M be the subset of $\mathbb{R}^2$ bounded by the parabolas $y=2x^2$ and $y=x^2+1$. a) Express M as a simple set w.r.t. the y-axis. b) Study whether M is simple w.r.t. the x-axis. c) Compute $\iint_M (x+2y)\,dx\,dy$.

40. Compute the integral $\iiint_M \frac{1}{(1+x+y+z)^3}\,dx\,dy\,dz$ where $M\subseteq\mathbb{R}^3$ is the set bounded by the coordinate planes and the plane $x+y+z=1$.

HW 41. Let M be the subset of $\mathbb{R}^2$ bounded by the parabola $y=x^2$ and the lines $x=2$ and $y=0$. a) Express M as a simple set first w.r.t. the y-axis and then w.r.t. the x-axis. b) Compute $\iint_M xy\,dx\,dy$ in two ways.

HW 42. Compute $\iiint_M z\,dx\,dy\,dz$ where $M=\left\{(x,y,z)\in\mathbb{R}^3 \;\middle|\; 0\le x\le 2,\ 0\le y\le 2\sqrt{x},\ 0\le z\le\sqrt{4x-y^2}\right\}$.