
Homework 10

Exercise 1 Compute the following integrals:

$$\iint_{\Omega} x^2 y \, dx \, dy \quad \text{with } \Omega = [1, 2] \times [-3, 4],$$

$$\iiint_{\Omega} \sin(x) y z \, dx \, dy \, dz \quad \text{with } \Omega = [0, \pi] \times [0, 1] \times [0, 2]$$

Exercise 2 1) Compute the integral $\iint_{\Omega} e^{x+y} \, dx \, dy$ with Ω the subset of \mathbb{R}^2 defined by $\{(x, y) \in \mathbb{R}^2 \mid |x| + |y| \leq 1\}$,

2) Compute the integral $\iint_{\Omega} (x - y) \, dx \, dy$ with Ω the subset of \mathbb{R}^2 defined by the three lines of equation $x = 0$, $y = x + 2$, and $y = -x$,

3) Compute the integral $\iint_{\Omega} xy \, dx \, dy$ with Ω the subset of \mathbb{R}^2 defined by the two functions of equation $y = x^2$ and $y = x^4$.

Exercise 3 Compute the integral $\iiint_{\Omega} (x + y + z)^2 \, dx \, dy \, dz$ with Ω the subset of \mathbb{R}^3 defined by the four planes of equation $x = 0$, $y = 0$, $z = 0$, and $x + y + z = 1$.