

Home Assignment 3 - Multivariable calculus, 2010.

Deadline: 21.10.2010.

1. Calculate $\iint_A (x^4 - y^4) e^{xy} dx dy$, where A is the region in the first quadrant bounded by the curves $xy = 1$, $xy = 2$, $x^2 - y^2 = 1$, and $x^2 - y^2 = 4$. (1/4 p)
2. Calculate $\iiint_K e^{-(x^2+y^2)z^2} dx dy dz$, where $K = \{(x, y, z) \in \mathbb{R}^3 \mid x^2 + y^2 \leq 3\}$. (1/4 p)
3. Calculate the volume of the region $B = \{(x, y, z) \in \mathbb{R}^3 \mid x \leq x^2 + y^2 \leq 2x, -x \leq y \leq x, 0 \leq z \leq x^2 + y^2\}$. (1/4 p)
4. Calculate the area of the part of the sphere $x^2 + y^2 + z^2 = 9$ for which $-1 \leq z \leq 2$. (1/4 p)
5. Calculate $\iiint_E \frac{xyz^2}{1 + x^2 + 2y^2 + 3z^2} dx dy dz$, where $E = \{(x, y, z) \in \mathbb{R}^3 \mid 1 \leq x^2 + 2y^2 + 3z^2 \leq 3, x \geq 0, y \geq 0\}$. (1/2 p)
6. Calculate the area of the part of the sphere $x^2 + y^2 + z^2 = 1$ that lies *outside* the two cylinders $x^2 + (y \pm \frac{1}{2})^2 = \frac{1}{4}$. (1/2 p)