Mathematical analysis 2, WNE, 2018/2019
meeting 26.

4 June 2019

Problems

1. Calculate
$$\int\int_{\mathbb{R}^2} e^{-x^2-y^2}\,dx\,dy.$$
2. Using the above problem calculate
$$\int_{-\infty}^{\infty} e^{-x^2}\,dx.$$
3. Calculate the surface area between $|y| = \sqrt{x-1}$ and $x - 2y - 4 = 0$.
4. In the instant $t = 0\,[s]$ the dancer which moves along OX is at the point 0. He moves with velocity $v = 2t \sin t^2\pi\,[m/s]$. At which point he will be after $1s$?
5. Calculate (using integrals!) the area of a circle of radius 1.
6. Calculate the length of a curve $y = \frac{2x^{3/2}}{3}$, for $0 \leqslant x \leqslant 1$.
7. Consider a three-dimensional block with base bounded by $x = 0, y = 0$ and $\sqrt{x} + \sqrt{y} = 1$. The height at point x, y is equal to $h(x, y) = 2x^2y$. Calculate its volume.
8. Derive the formula for surface are of a cone of height l and radius of the base r,
9. Calculate the volume of a subset of $\mathbb{R}^3$ bounded by planes $z = 0$ and $z = x$ and the surface of the cylinder $x^2 + y^2 = 4$.
10. Using the polar coordinates find the volume of the subset of $\mathbb{R}^3$ bounded by the plane $z = 0$ and the surface of the paraboloid described by $z = 25 - x^2 - y^2$.

Homework

Group 8:00

Using the polar coordinates find the surface area of a subset of $\mathbb{R}^2$ bounded from the inside by the circle $x^2 + y^2 = 1$ and from the outside by the curve described in the polar coordinates by $r = 2 + \cos\varphi$.

Group 9:45

Using the polar coordinates find the surface area of a subset of $\mathbb{R}^2$ bounded from the inside by the circle $x^2 + y^2 = 4$ and from the outside by the curve described in the polar coordinates by $r = 4 + 2\cos\varphi$.