N. 12

1. (3 points) Calculate the limit $\lim\limits_{x \to 0} \dfrac{\ln(1 - x) + \operatorname{arctg} x}{x^2}$.

2. (3 points) Find the integral $\displaystyle\int \dfrac{\operatorname{arctg} e^x}{e^x}\, dx$.

3. (3 points) Calculate the definite integral $\displaystyle\int_0^{\frac{1}{16}} \dfrac{1}{\sqrt{x} - \sqrt[4]{x}}\, dx$.

4. (3 points) Find the surface area of the body obtained by revolution of the curve $x^{2/3} + y^{2/3} = 1$ around the Oy axis.