

MATHEMATICAL ANALYSIS I

Exam retake, version 4.

- (2+5p.)** Limit of a sequence: definition, examples. Theorem about three sequences. Find the minimal and maximal values of the function $f(x) = \frac{x+1}{x^2+2x+2}$ on the interval $[0, 2]$.
- (3+4p.)** Vertical asymptotes and slant/horizontal asymptotes: definition, examples. Formulae for the coefficients of for an asymptote at $\pm\infty$. Write the equation for the tangent line to the graph of the function $f(x) = \log_2(x^2+4)$ at the point $x = -2$.
- (2+5p.)** The change of variables formula for indefinite integral. Calculate the definite integral $\int_0^1 x^2 10^x dx$.
- (2+5p.)** Write the formulae for the surface area for the bodies of revolution of the curve $y = f(x)$ w.r.t. the axis Ox and Oy . Calculate the limit $\lim_{x \rightarrow 0} \frac{1 - \cos x + \ln \sqrt{1-x^2}}{x^4}$.
- (2+5p.)** Write the Taylor formula of the order n with the residual term in the Lagrange form. Find the integral $\int \frac{x-2}{x^4+3x^2+2} dx$