

List 0. Derivative of function.

Task 1. Calculate the derivative of the functions:

$$a. f(x) = \sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}; \quad b. f(x) = (1-x^2)\sqrt{x^3 + \frac{1}{x}}; \quad c. f(x) = \ln \frac{1+2^x}{1-2^x}; \quad d. f(x) = \left(\sqrt{x-1} - \frac{1}{2}\right)e^{2x};$$

$$e. f(x) = \sqrt[4]{\frac{1+2x}{1-2x}}; \quad f. f(x) = \frac{(1+x)\operatorname{arctg}\sqrt{x}}{x}; \quad g. f(x) = \ln(e^{2x} + \sqrt{e^{4x}-1}); \quad h. f(x) = \frac{x \arcsin x}{\sqrt{1-x^2}}.$$

Task 2. Find the equations of tangent lines and normal lines to the graph of the functions given below at the point $P(x_0, f(x_0))$:

$$a) f(x) = \frac{1+\sqrt{x}}{1-\sqrt{x}}, \quad x_0 = 4; \quad b) f(x) = \frac{2x}{x^2+1}, \quad x_0 = 1; \quad c) f(x) = e^{1-x^2}, \quad x_0 = -1; \quad d) f(x) = \ln x, \quad P(e, 1).$$

Task 3. Calculate the intersection angles for graphs of the functions:

$$a. f(x) = x^3, \quad g(x) = \sqrt[3]{x}; \quad b. f(x) = e^x, \quad g(x) = e^{2x} - 2; \quad c. f(x) = 2x^2 - x + 1, \quad g(x) = x^2 + 4x - 3.$$

Task 4. Using differentials calculate approximation of numbers:

$$a. \sqrt[3]{8,36}; \quad b. \operatorname{arctg} 1,05. \quad c. \arcsin(0,08).$$