

12012, Sections 001 and 002, Calculus with Precalculus II.

HomeWork 9, due Wednesday April 18

Instructor: Prof. Artem Zvavitch

You must show all details of your calculations!

**Problem 1.** Find  $f'(x)$

- $f(x) = \frac{\ln(x+1)}{\ln(x-1)}$ .
- $f(x) = \ln(x^4 \sin^2 x)$ .
- $f(x) = \frac{\log_2(x+1)}{\log_2(x-1)}$ .
- $f(x) = x^5 - 5^x$ .
- $f(x) = 5^{-\frac{1}{x^2}}$ .
- $f(x) = 2^{3^{x^4}}$ .

**Problem 2.** Find  $y'$  if  $y = \ln(x^2 + y^2)$ .

**Problem 3.** Find equation of the tangent line to function

$$f(x) = \ln(x^3 - 7),$$

at point  $(2, 0)$ .

**Problem 4.** Use logarithmic differentiation to find the derivative of the function

- $f(x) = (2x + 4)^{10}(x^2 - 6)^7$ .
- $f(x) = \sqrt{x}e^{-x^2}(2x + 1)^7$ .
- $f(x) = (\ln x)^{\sin x}$ .
- $f(x) = x^{e^{x^2}}$ .

**Problem 5.** Evaluate the integral.

- $\int_2^4 \frac{3}{x} dx$ .
- $\int_4^9 \left( \sqrt{x} + \frac{1}{\sqrt{x}} \right) dx$ .
- $\int_e^6 \frac{dx}{x \ln x}$ .
- $\int \frac{\cos x}{2 + \sin x} dx$ .
- $\int \frac{e^x}{e^x + 1} dx$ .
- $\int_1^2 10^x dx$ .

**Problem 6.** Evaluate.

- $\sin^{-1} \frac{1}{\sqrt{2}}$ .
- $\tan^{-1}(\tan 3\pi/4)$ .
- $\tan(\sin^{-1}(\frac{2}{3}))$ .
- $\cos(\tan^{-1} 2 + \tan^{-1} 3)$ .