Exam 2 - Practice 2

Notice:

- *Calculators are not allowed.*
- *Exam 2 is scheduled for Tuesday, Nov 12.*
- *A page of formula is allowed. Only formulas are allowed on the page. The page will be checked during the exam.*

Problem 1.

Find $f'(x)$.

$$f(x) = -\frac{x}{3} + \frac{3x^4}{2} - \frac{1}{\sqrt[4]{x^3}} + \frac{5}{\sqrt{x}} + 2024x + 1$$

$$f(x) = (\sqrt[3]{x} + 1)(x^3 + x + 1)$$

$$f(x) = \frac{x^2 + 2}{x^2 - 2} \text{ (Simplify your answers.)}$$

$$f(x) = 3x \tan x$$

$$f(x) = \frac{x^2}{2 \cos x}$$

$$f(x) = \cos\left(x + \sin x\right)$$

$$f(x) = \tan^{2024} x$$

$$f(x) = \tan\left(x \sin x\right)$$

$$f(x) = \left(3 \tan x - 2 \sin x\right)^{2024}$$

$$f(x) = e^x + 1007^x - 2 \log_4 x + 7 \ln x - \frac{3 \log_6 x}{5} + \frac{\log_2 x}{3} + 2024x + 1$$

$$f(x) = \ln\left(\sqrt[3]{x} + x^2 + x + 1\right)$$

$$f(x) = 100^{\csc x - \tan x + 2x^3}$$

$$f(x) = 3^{x^2 \cos x}$$

Problem 2

$$y + x^2 y + 2x^3 y + x^2 = 1$$

(a) Find dy/dx or y' by differentiating implicitly.

(b) Solve the equation for y as a function of x, and find dy/dx from that equation.

Problem 3

Given the equation

$$x^3y + y^3x + 1 = 3xy$$

1. Use implicit differentiation to find dy/dx or y'

2. Find an equation for the tangent line at the point (1, 1)

Problem 4

(a) Find the local linear approximation of $f(x) = \sqrt[3]{x}$ at $x_0 = 1$

(b) Use the local linear approximation obtained in part (a) to approximate $\sqrt[3]{.9}$