Exam 2

Notice:

- *Calculators are not allowed.*
- *A page of formula is allowed. Only formulas are allowed on the page.*

Problem 1.

(5 points each) Find $f'(x)$.

$$f(x) = -\frac{2x}{3} + \frac{5x^2}{3} - \frac{1}{\sqrt[6]{x^3}} + \frac{1}{\sqrt{x}} + 2024x^2 + x + 2024$$

$$f(x) = (\sqrt{x} + 1)(x^2 + 2x + 1)$$

$$f(x) = \frac{x^3 + 1}{x^3 - 1}$$ (Simplify your answers.)

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

$$f(x) = \frac{\sin x}{x}$$

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

$$f(x) = \cos^2 x$$

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

$$f(x) = \left(3\sin x - 2\cos x\right)^2$$

$$f(x) = e^x + 17^x - 2\log_3 x + 8\ln x - \frac{3\log_2 x}{2} + \frac{\log_9 x}{3} + 2024x + 1$$

$$f(x) = \log_3\left(\sqrt{x} + x^2 + 1\right)$$

$$f(x) = 100^{\cos x - \sin x + 3x^2}$$

$$f(x) = e^{x\cos x}$$

Problem 2

(8 points each)

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

(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.

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

Problem 3

(5 points each)

(a) Find the local linear approximation of $f(x) = \sqrt[4]{x}$ at $x_0 = 1$

(b) Use the local linear approximation obtained in part (a) to approximate $\sqrt[4]{1.1}$