

MIDTERM II, FORM A

MATH 132 WI00

I. Find the derivatives of the following functions.

(a) $y = \ln(2x + 1)$ (5 points)

(b) $y = \ln\left(\sqrt[4]{\frac{1+x^2}{1-x^2}}\right)$ (10 points)

(c) $y = e^{5x^2-11x+12}$ (10 points)

II. $\int(x^3 - \frac{1}{x^4} + 2) dx$ (10 points)

III. Given $y' = -x^2 + 4x + 1$ and $y(3) = 8$, find y . (10 points)

IV. Let $f(x) = 2x^3 - 3x^2 - 36x - 50$.
(a) Find its y -intercept. (5 points)

(b) Use derivatives to find the intervals on which $f(x)$ is increasing and on which $f(x)$ is decreasing (5 points)

(c) Use the information obtained in part (b) to find points of relative maxima and relative minima (5 points)

(d) Use derivatives to determine the intervals on which graph is concave up and on which it is concave down (5 points)

(e) What are its point(s) of inflection? (5 points)

V. (a) Use the second derivative test to find relative max and relative min for the function $f(x) = \frac{x^4}{4} + \frac{x^3}{3} - x^2 + 9$ (5 points)

(b) Find when absolute max and absolute min occur for the function of part (a) in the interval $[0, 2]$ (5 points)

VI. The demand equation for a monopolist's product is $p = 2700 - q^2$, where p is the **price per unit** (in dollars), when q units are demanded. (a) Find the value of q for which the revenue is maximum. (b) What is the maximum revenue? (10 points)

VII. Given

$$y = \frac{x^2}{x+3}$$

$$y' = \frac{x^2 + 6x}{(x+3)^2}$$

$$y'' = \frac{18}{(x+3)^3}$$

use the derivatives given above to find where the graph of this function is (a) concave up, (b) concave down, (c) where y has points of inflection (10 points)