MATH 1500 A01 Assignment 3 Winter 2010 (Due date is March 19)

[20] 1. Find the absolute maximum and the absolute minimum values of the each function on the given interval. Indicate where they are attained.

(a) $f(x) = x^6 - 3x^2$ on the interval $[-2, 0]$.

(b) $g(t) = t^5 - 5t^4 + 5t^3$ on the interval $[-1, 2]$.

(c) $h(x) = 4\sqrt{x+1} - x$ on the interval $[0, 8]$.

(d) $k(x) = x + \sqrt{1-x^2}$ on the interval $[-1, 1]$.

[40] 2. Find the derivative of each of the following functions.

(1) $y = e^{\tan x} \log_7(x^3 + \cos x)$

(2) $y = (\ln x)^2 + 2^{\ln x} + \pi^{\ln \pi}$

(3) $y = \dfrac{e^{\sin(\ln x)}}{1 + \sqrt{\ln x}}$

(4) $f(x) = \sqrt{\dfrac{e^{x \ln(x^2+1)}}{1+x^2}}$

(5) $g(x) = \ln^2 [\sin x \cos x - e^{x^2}]$

(6) $h(x) = \ln[(2 + \sin x)^{x^2}]$

(7) $k(x) = (\dfrac{1}{x})^{\ln x}$

(8) $l(x) = [\ln|4x| - \dfrac{1}{x} + x^{\ln \pi}]^{10}$

[18] 3. Find $\dfrac{dy}{dx}$ at the given point.

(a) $\ln(x + y^3) + x^3 y = 1 - e^y$ at $(1, 0)$.

(b) $x^y = y^x$ at $(1, 1)$.

(c) $y = x^{x^2} + x^{\sec(x-1)}$ at $(1, 2)$.

[72] 4. For each of the following functions first find answer to each of the following parts, then use all the informations to sketch the graph of the function.

(a) Domain of the function

(b) Equation(s) of horizontal asymptote(s)

(c) Equation(s) of vertical asymptote(s)

(d) x-intercept

(e) y-intercept

(f) Critical Number(s)

(g) Open interval(s) where f is increasing

(h) Open interval(s) where f is decreasing

(i) x and y coordinates of all relative maxima

(j) x and y coordinates of all relative minima

(k) Open interval(s) where f is concave upward

(l) Open interval(s) where f is concave downward

(m) x and y coordinates of all inflection point(s)

1. $f(x) = 5 - 8x^2 + x^4$
2. $g(x) = \dfrac{3x^2 - 6}{(x-1)^2}$
3. $h(x) = \dfrac{8(x-2)}{x^2}$
4. $k(x) = xe^{-x}$