

Name: \_\_\_\_\_

Student Number: \_\_\_\_\_

CALCULUS I, EXAM II, FALL 2001

JUSTIFY YOUR ANSWERS!!

(1) Find the derivative  $y'$  of the following functions:

(a)  $f(x) = x^\pi$

(b)  $f(x) = \frac{\tan^{-1}(2x)}{x^3+1}$

(c)  $f(x) = (x^3 + 6x - 4)^{25}$

(d)  $f(x) = \tan(x^5)$

(e)  $f(x) = \ln(\sin(x^4))$

(f)  $x^4 - y^5 = \sec(x^2y^3)$

(2) Find the anti-derivative of the following functions:

(a)  $f(x) = \frac{x^9 - 4x}{x^2}$

(b)  $f(x) = x \sin(x^2)$

(c)  $f(x) = \frac{4}{\sqrt{2-2x^2}}$

(3) If the radius of a round cylinder increases at the rate of  $5m/s$  while the height decreases at the rate of  $20m/s$ , is the volume increasing or decreasing and at what rate, when  $h = 5m$  and  $r = 2m$ ?

(4) If a square box is measured to have sides  $7m$  long with an error of less than  $.001m$ , use the differential to estimate the error of the volume of the box.

- (5) An advertising executive wants to design a cylindrical container that looks as big as possible. If he asks you for the radius and height of a cylinder with maximal surface area which holds a volume of  $1dm^3$ , what is your answer? [You must justify your answer!]

- (6) Graph the following function. State **all** relevant information next to the graph. [You must justify your answers!]

$$y = f(x) = x^{2/3}(x^2 - 8)$$