Name:_____

Student Number:_____

Final Exam

CALCULUS 1; FALL 2001

JUSTIFY ALL YOUR ANSWERS

1. Find y':

   (a) (4pt) $y = \pi^x$

   (b) (4pt) $y = (x^2 + 1)^3$

   (c) (4pt) $y = \frac{x^3+1}{x^3-1}$

   (d) (4pt) $y = x^2 \sec(x)$

   (e) (4pt) $y = \ln(\sin(x))$

   (f) (4pt) $y = \int_0^{\sin(x)} \sqrt{1-t^2}\, dt$

   (g) (6pt) $x^3 + y^3 = \cos(xy)$

2. Find the antiderivative:

   (a) (4pt) $\int \frac{\sqrt{x}+x^3+x}{x^2}\,dx$

   (b) (4pt) $\int x^2(1+x^3)^5\,dx$

   (c) (4pt) $\int \sin(5x)\,dx$

   (d) (4pt) Use the Fundamental Theorem of Calculus to define an antiderivative for the function: $f(x) = \sin(x^2)$

3. (6pt) Find the tangent line to the graph of the function $y = \tan(3x)$ at $x = \pi/4$

4. (a) (3pt) Find the linear approximation for the function $y = f(x) = \sqrt{x}$ at the point $a = 4$.

(b) (3pt) Use the above approximation to solve the equation

$$\sqrt{x} = -3x + 13.9$$

5. (6pt) Find the absolute maximum and minimum of the function $y = x^{2/3}$ on the interval $[-1, 8]$.

6. (5pt) State the definition of the definite integral $\int_a^b f(x)dx$.

7. (6pt)Set up an upper Riemann sum with $n = 5$ terms for $\int_0^\pi \sin(x)dx$

8. (6pt) Which definite integral corresponds to the following limit of Riemann sums:

$$\lim_{n\to\infty} \sum_{i=1}^{n} \frac{5}{n} \ln(1 + \frac{5i}{n})$$

9. (19) Graph the function below. STATE ALL RELEVANT INFORMATION INCLUDING y' AND y" ETC..

$$y = \frac{x^2 - 4}{x^2 - 3}$$

10. (BONUS-5pt) Find all the critical points of the function $f(x) = \int_0^x \sin(t^2)\, dt$.