Time: 2 hours

25/01/03

MATH 101 FINAL EXAM

First Semester 02-03

INSTRUCTIONS

1. Answer questions on the **WHITE** question sheet in the spaces provided. Use the back of the sheet if you need more space. Put an arrow to indicate that there is more writing on the back.

2. Use the BLUE sheet for scratch only.

3. Write your Name and Section Number on both the white and blue sheets. On the white sheet, please write them clearly on top of the page. You will lose grades if you don't.
   Section numbers, according to problem-solving sessions, are as follows:

   Section 5: Thursday, 1:00 p.m.
   Section 6: Tuesday, 11:00 a.m.
   Section 7: Thursday, 4:00 p.m.
   Section 8: Thursday, 9:00 a.m.

4. All work towards solutions must be shown on white sheet. Writing an answer by itself will not be given credit.

5. You may only ask questions that have to do with reading the text correctly.

6. Cheating will not be tolerated.

Time: 2 hours

25/01/03

MATH 101
First Semester, 02-03
FINAL EXAM

1. Use implicit differentiation to find the slope of the tangent line to the curve $2x^3 + 2y^3 - 9xy = 0$ at the point (2,1). (10%)

2. Find each limit. Show your work. (14%)

a) $\lim_{x \to 0} \frac{\tan 2x}{5x}$

b) $\lim_{y \to -3} \frac{1}{y^2 - 9}$

3. a) On what intervals is the function $f(x) = \frac{(x^2 - 2x + 1)}{(x-1)(x-3)}$ continuous? (10%)

Explain how you got them.

b) What value should be assigned to f(1) to make the extended function continuous at x = 1?Give a reason for your answer.

4. a) Evaluate the integral $\int(8t^3 - 3t^2 + \frac{1}{t^2})dt$. (12%)

b) Solve the initial value problem:

$\frac{dy}{dt} = 8t^3 - 3t^2 + \frac{1}{t^2}$, and y = 8 for t = 1.

5. Evaluate each integral. Show your work. (18%)

a) $\int_0^{\frac{\pi}{4}} \frac{\sec^2 z dz}{(1+2\tan z)^3}$

b) $\int_0^{\frac{\pi}{12}} \cos^2 3x dx$

6. a) Graph the function $g(x) = 3x - x^2$. (16%)

b) Integrate the function g(x) over the ~~integral~~ interval $[0,4]$.

c) Find the area of the region between the curve $y = 3x - x^2$ and the x-axis on the interval $[0,4]$.

7. Find the area of the region enclosed between the curve $y = 1 - x^2$ and the line $y = -3$. Draw a sketch of the line and the parabola and shade the required region. (10%)

8. a) State the Mean Value Theorem. (10%)

b) Apply the Mean Value Theorem to the function $f(x) = x^3$, on the interval $[0,2]$. Find the coordinates (c, f(c)) of the point whose existence is assured by the Mean Value theorem.