KOÇ UNIVERSITY

MATH 102 - CALCULUS

Midterm Exam March 25, 2005

Duration of Exam: 90 minutes

INSTRUCTIONS: No calculators may be used on the test. No books, no notes, no questions, and talking allowed. You must always **explain your answers** and **show your work** to receive **full credit**. Use the back of these pages if necessary. **Print (use CAPITAL LETTERS) and sign your name, and indicate your section below. GOOD LUCK!**

Surname, Name: _____

Student ID no: _____

Signature: _____

Section (Check One):

Section 1 (Vahap Erdoğdu) : ___
Section 2 (Burak Özbağcı- MW: 11:30-13:20): ___
Section 3 (Özgür Müstecaplıoğlu): ___
Section 4 (Tolga Etgü - MW: 9:30-11:20): ___
Section 5 (Tolga Etgü - MW: 12:30-2:20): ___
Section 6 (Burak Özbağcı- MW: 14:30-15:20) : ___

PROBLEM	1	2	3	4	**TOTAL**
POINTS	25	25	25	25	**100**
SCORE					

Name:

Problem 1

(1.a) **(5 pts)** Find

$$\lim_{x \to -2} \frac{\sqrt{x^2+5}-3}{x+2}$$

(1.b) **(10 pts)** Find the asymptotes of the graph of

$$y = \frac{2x-6}{x+1}$$ (As usual, show your reasoning)

(1.c) **10 pts** $f(x) = \begin{cases} \sin^2 x / \tan x^2 & , x \neq 0; \\ c^2 & , x = 0. \end{cases}$

Find (i) $\lim_{x \to 0} f(x)$ if it exists; (ii) Find all values for c that will make f continuous.

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Problem 2

(2.a) **(10 pts)** Find $r'(0)$ for

$$r = \left(\frac{1-\sin\theta}{1+\cos\theta}\right)^2$$

(2.b) **(10 pts)** Find the slope of the line tangent to the curve $y^2 + 2xy + x^2 = (xy^3 + x^2)^4$ at the point $(1, 0)$.

(2.c) **5 pts** Find dy/dx at $t = \pi/4$ if $x = t^2 + 2, y = \tan t - 3$.

Name:

Problem 3 Answer the following questions for $y = 4x^3 - x^4$

(3.a) **(5 pts)** Find y' and y''.

(3.b) **(5 pts)** Find the critical points and characterize the function's behavior at each one.

(3.c)**(5 pts)** Find where the curve is increasing and where it is decreasing.

Name:

(3.d) **(5 pts)** Find where the graph of f is concave up and where it is concave down. Find the points of inflection, if they occur.

(3.e) **(5 pts)** Sketch the curve.

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Problem 4 (25 pts) You want to construct a box of volume 60m^3, whose base length is 3 times the base width. The material used to build the top and bottom cost 10YTL/m^2 and the material used to build the sides cost 6YTL/m^2. Argue that it is possible to minimize the cost to build the box by suitably chosen dimensions and determine these most cost efficient dimensions.