KOÇ UNIVERSITY

MATH 102 - CALCULUS

Midterm II May 5, 2006

Duration of Exam: 90 minutes

INSTRUCTIONS: No calculators may be used on the test. No books, no notes, 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.**

Surname, Name: _____

Signature: _____

Section (Check One):

Section 1: S. Küçükçifci ___
Section 2: T. Albu (9:30) ___
Section 3: E.Ş. Yazici (15:30) ___
Section 4: T. Albu (12:30) ___
Section 5: E.Ş. Yazici (11:00) ___

PROBLEM	POINTS	SCORE
1	40	
2	10	
3	10	
4	10	
5	10	
6	10	
TOTAL	**100**	

Problem 1. Evaluate the following indefinite and definite integrals:

(a) (10 pts) $\displaystyle\int \frac{x^3}{\sqrt{x^4+4}}\,dx =$

(b) (10 pts) $\displaystyle\int_0^1 \sqrt{2x}\,(\,\sqrt{x}+\sqrt{2}\,)\,dx$

(c) (10 pts) $\displaystyle\int \sin x \cos x\,dx$

(d) (5 pts) $\displaystyle\int_1^{-1} x^2(\,x^3+1\,)^4$

Problem 2. Calculate the following limit or show that it does not exist:

$$\lim_{x \to 0} \frac{1 - \cos 3x}{1 - \cos 5x} =$$

Problem 3.

(a) (5 pts) Find the area between the curve $y = x^2$ and the x-axis between 1 to 3.

(b) (5 pts) Find the volume of the solid formed by revolving the area you obtain above (problem (3-a)) about the x-axis.

Problem 4. Find the absolute extremum of the function $f(x) = \dfrac{2x}{(x+2)^2}$ on [-1,3].

Problem 5. The revenue of a manufacture's product is given by the function

$$R(q) = 20q - \frac{q^2}{4}$$

where q is the number of units. At What production level will there be a maximum revenue? What is the maximum revenue?

Problem 6. A function $f(x)$ satisfies the properties given below.

1-)Domain of f : $\mathbb{R}$

2-)$f(0) = 1$; $f(1) = 0$; $f(-1) = 0$; $f(2) = 1$.

3-) $\lim_{x\to\infty} f(x) = 2$; $\lim_{x\to-\infty} f(x) = -1$

4-)$f'(1) = 0$ and $f'(0)$ is undefined

5-)The sign table of $f'(x)$ is as follows

	$-\infty$		0		1		∞
f'	$\vert$	$+++$	$\Vert$	$---$	$\vert$	$+++$	$\vert$

6-) The sign table of $f''(x)$ is as follows

	$-\infty$		0		2		∞
f''	$\vert$	$+++$	$\Vert$	$+++$	$\vert$	$---$	$\vert$

a-) State the local maximum points, local minimum points, inflection points and the intervals where the graph is concave up or concave down.

b-) Sketch the graph of a function which satisfies the properties given.