KOÇ UNIVERSITY
MATH 102 - CALCULUS
Midterm II   December 16, 2008
Duration of Exam: 75 minutes

INSTRUCTIONS: No calculators may be used on the test. No books, no notes, and no 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: T. Etgü (11:00)   ——
Section 2: T. Etgü (15:30)   ——
Section 3: S. Ünver (9:30)   ——

PROBLEM	POINTS	SCORE
1	30	
2	10	
3	25	
4	10	
5	25	
TOTAL	**100**	

Problem 1. Compute the following integrals:

(i) (7 pts.) $\int_0^1 2x^3 dx$

(ii) (7 pts.) $\int_0^{\pi/6} \cos(2x) dx$

(iii) (8 pts.) $\int 2x^3 \sqrt{3x^4 - 1} dx$

(iv) (8 pts.) $\int \frac{\cos(x)}{\sin^2(x)} dx$

Problem 2. Compute the following limit using L'Hopital's theorem. (10 pts.)

$$\lim_{x \to 1} \frac{\sin(x^2 - 1)}{x - 1}$$

$$\lim_{x \to 1} \frac{\sin(x^2 - 1)}{3}$$

Problem 3. Let $f(x) = x^3 - 3x^2 - 9x + 5$

(i)(7 pts) Find the local maximum and minimum points of $f(x)$ and the intervals where f is increasing/decreasing.

(ii) (7 pts.) Find the inflection point(s) of $f(x)$ and the intervals where f is concave up/down.

(iii) (11 pts.) Sketch a graph of $y = f(x)$.

Problem 4. Compute the derivative of (10 pts.)

$$\int_0^x \cos(t^2 - 3) \, dt$$

$$5$$

Problem 5. Find the area that is bounded by the graph of $y = -x^2 + 3x + 2$, and the lines $y = x - 1$, $x = 0$, $x = 3$. (25 pts.)