KOÇ UNIVERSITY

MATH 102 - CALCULUS

Final Exam June 10, 2010

Duration of Exam: 120 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.**

Name: _____

Surname: _____

Signature: _____

Section (Check One):

Section 1: Sultan Erdoğan M-W (14:00) ___
Section 2: Benjamin Smith M-W (17:00) ___
Section 3: Selda Küçükçifçi T-Th (11:00) ___
Section 4: Selda Küçükçifçi T-Th (14:00) ___
Section 5: Sultan Erdoğan M-W(12:30) ___

PROBLEM	POINTS	SCORE
1	12	
2	30	
3	18	
4	11	
5	20	
6	14	
TOTAL	**105**	

1. (12 points) Find the area enclosed by the curves $y = x^3$ and $y = 2x^2 - x$. (Simplify your answer.)

2. Evaluate the following integrals. (Simplify your answers.)

(a) (7 points) $\int 2x\cos(2x+1)\,dx.$

(b) (7 points) $\int \dfrac{6-5x}{2x^2+5x-3}\,dx.$

(c) (8 points) $\int_0^{\pi/2} \sin^3 x \cos^3 x \, dx$.

(d) (8 points) $\int_0^{\ln 5} \dfrac{e^x}{2e^x - 1} \, dx$.

3. (a) (6 points) Find the derivative of the function $f(x) = \sqrt{(x^2.5^x)^3}$.

(b) (6 points) Find dy/dx if $\ln x + \ln(y^2) = 3$.

(c) (6 points) Write the equation of the tangent line to the curve $y = 1 - e^x$ at the point where its graph crosses the x-axis.

4. (11 points) The product of two positive numbers is 54. Find the numbers if the sum of the first number and the square of the second number is as small as possible.

5. Evaluate the following limits if they exist. If the limit does not exist explain why. State the type of indeterminate form, if any.

(a) (6 points) $\lim_{x \to 2} \dfrac{|x-2|}{x^2 - x - 2}$

(b) (6 points) $\lim_{x \to \infty} \sqrt{x^2 - x} - x$

(c) (8 points) $\lim_{x \to 0^+} x^{\sin x}$

6. (a) (6 points) If $F(x) = \int_1^{\sqrt{x}} \sin t^2 dt$ then find $F'(4)$.

(b) (8 points) Evaluate the integral $\int_2^{\infty} \frac{1}{x(\ln x)^2}\, dx$