KOÇ UNIVERSITY
MATH 102 - CALCULUS
Final Exam   June 6, 2005
Duration of Exam: 120 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: 12:30-14:20):   ——
Section 6 (Burak Özbağcı- MW: 14:30-16:20) :   ——

PROBLEM	1	2	3	4	5	6	7	8	9	TOTAL
POINTS	10	10	10	10	10	10	10	20	10	**100**
SCORE										

Name:

Problem 1 (10 pts) Let

$$f(x) = \begin{cases} \arctan(\frac{1}{x}) & , x > 0; \\ a + x & , x \leq 0. \end{cases}$$

Find the value for a that will make f continuous.

Problem 2 (10 pts) Find the tangent line to the graph of

$$f(x) = \int_0^{x^2} \sqrt{1 + t^3} \, dt$$

at $x = \sqrt{2}$.

Name:

Problem 3 (10 pts) Find $f'(1)$ if

$$f(x) = \frac{\sin(\ln x)}{\cos(e^x)} \quad .$$

Problem 4 (10 pts) Find the following limit.

$$\lim_{n \to \infty} \left(\frac{3+n}{n} \right)^{2n}$$

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Problem 5 (10 pts) Evaluate the following integral.

$$\int_0^1 x^2 e^x \ dx$$

Name:

Problem 6 (10 pts) Find the area of the region bounded by the curves $y = x^2 - 2$ and $y = -|x|$.

Name:

Problem 7 (10 pts) Determine whether the following improper integral is convergent or divergent. Evaluate the integral if it is convergent.

$$\int_2^\infty \frac{2}{x^2 - 1}\, dx$$

Problem 8 Determine whether each of the following infinite series is convergent or divergent.

(8.a)**(5 pts)**

$$\sum_{n=1}^\infty \frac{n^2 + 2n + 3}{2n^3 + 5n + 4}$$

Name:

(8.b) **(5 pts)**

$$\sum_{n=1}^{\infty} \cos\left(\frac{1}{n}\right)$$

(8.c) **(10 pts)**

$$\sum_{n=1}^{\infty} \frac{2^n n! n!}{(2n)!}$$

Name:

Problem 9 (10 pts) Find the radius of convergence and the interval of convergence of the following power series.

$$\sum_{n=1}^{\infty} \frac{x^n}{\sqrt{n}3^n}$$