
KOÇ UNIVERSITY
MATH 102 - CALCULUS
Midterm I May 10, 2010
Duration of Exam: 90 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	25	
2	12	
3	20	
4	18	
5	25	
TOTAL	100	

1. Let $f(x) = x^4 - 2x^2 + 1$.

(a) (7 points) Find the critical numbers of f and the intervals on which f is increasing/decreasing.

(b) (3 points) Find the local maximum/minimum point(s) of f . (Specify x and y -coordinates of each point.)

(c) (5 points) Find the intervals on which f is concave up/down.

(d) (2 points) Find the inflection point(s) of f . (Specify x and y -coordinates of each point.)

(e) (8 points) Sketch a graph of f . (Indicate all maximum/minimum/inflection points.)

2. (12 points) Find the absolute maximum and the absolute minimum values of $f(x) = 2x^3 - 3x^2 - 12x + 12$ on the interval $[-2, 1]$.

3. (20 points) If we want to make a box with a square base (kare taban) and closed top (tavam dahil) having a volume of 8000 cm^3 , find the dimensions (boyutlar) of the box that minimize the amount of material used.

4. Evaluate the following limits. State the type of indeterminate form, if any.

(a) (6 points) $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2}$

(b) (12 points) $\lim_{x \rightarrow \infty} (x^2 + 1)^{\frac{1}{x}}$

5. (a) (5 points) Evaluate $\int_0^1 x^{1/3}(x+2)dx$.

(b) (8 points) Find the general indefinite integral $\int \left(\frac{x^2 e^x - 1}{x^2} - \frac{2}{x} \right) dx$. (Simplify your answer.)

(c) (6 points) Find f where $f'(x) = 3e^x - 3$ and $f(0) = 2$.

(d) (6 points) Find the area under the curve $y = \frac{1}{2} \sin x$ from $x = 0$ to $x = \pi$.