Middle East Technical University – Northern Cyprus Campus

MAT 101 - Mathematics for Social Sciences

Fall 2009/2010

Midterm Examination 2

21th December 2009

Instructors: Assistant Prof. Dr.Bertuğ AKINTUĞ and Assistant Prof. Dr. Erhan Gurel

Duration: 120 minutes

Surname: ______________________________

Name: ________________________________

Student Number: _______________________

Section Number: ___________

Q1 25pt.	Q2 10 pt.	Q3 30 pt.	Q4 25 pt.	Q5 10 pt.	**TOTAL 100 pt.**

Please READ the following remarks before you start the exam.

- You are not allowed to exchange anything.
- Show all your calculations.
- No partial credit will be given for unsupported answers.

1. (25 pt.)

(a) Find y' if $y = \ln \sqrt[3]{\dfrac{x(x^2-1)}{x^4+1}}$

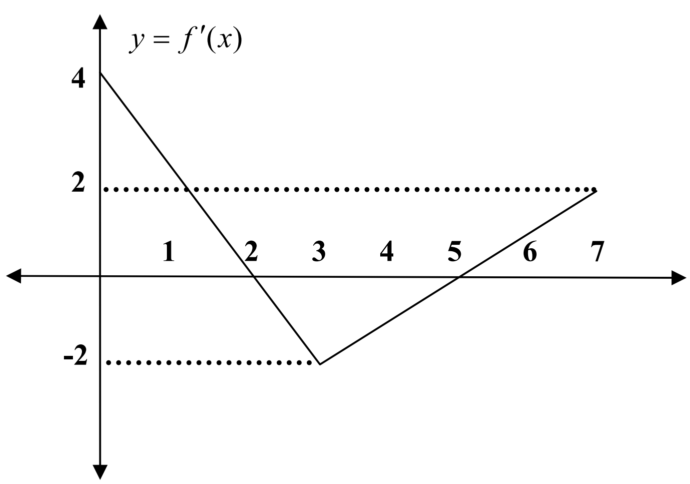
(b) Find $f'(x)$ if $f(x) = x^3 \ln \sqrt{2x+1}$

(c) Find $\frac{dy}{dx}$ in terms of x and y if $x^2y^2 - x + y = xy$

(d) Find $y'\left(=\frac{dy}{dx}\right)$ if $y = \frac{e^x\left(x^2+1\right)^3}{x^3 \ln x}$

(e) Find $y''\left(=\dfrac{d^2y}{dx^2}\right)$ if $xy - x = 2y$

2. (10 pt.) The graph of a derivative function $f'(x)$ is given.



Please fill the blanks or circle the correct answer.

- **a)** Function $f(x)$ has critical point(s) at x =………
- **b)** Function $f(x)$ has local min(s) at x =………
- **c)** Function $f(x)$ has inflection point(s) at x =………
- **d)** $f(0)$ is bigger / smaller than $f(1)$

3. (30 pt.) Let $f(x) = \dfrac{x^2 - 4x + 3}{x^2 - 4x}$.

(a) Find the intercepts

(b) Check for the symmetry

(c) Find the intervals of increase/decrease.

(d) Find the asymptotes

(e) Find the intervals of concavity, and indicate the inflection point(s) (if any).

(f) Sketch the graph

4. (25 pt.)

(a) Find $\int (6x^2 + 2)e^{x^3+x}\,dx$

(b) Find $\int (e^3 - 3^e + 3e - \frac{3}{e})\,dx$

(c) Find $\int \frac{10}{(2x+1)^2}\,dx$

(d) Find $\int 4x\, e^{2x}\, dx$

(e) Find $\int \frac{3x^5}{(1+x^3)^2}\, dx$

5. (10 pt.) Consider the function $f(x) = -2x^4 + 4x^2$,

(a) Find the relative (local) extrema (max/min).

(b) Find the absolute (global) extrema (max/min) of $f(x)$ on [-1, 2].