ÇANKAYA UNIVERSITY

Department of Mathematics and Computer Science

MATH 155 Calculus for Engineering I

2^{nd} Midterm

December 18, 2006

17:40-19:30

Surname : _____

Name : _____

ID # : _____

Department : _____

Section : _____

Instructor : _____

Signature : _____

- The exam consists of 6 questions.
- Please read the questions carefully and write your answers under the corresponding questions. Be neat.
- Show all your work. Correct answers without sufficient explanation might not get full credit.
- Calculators are not allowed.

GOOD LUCK!

Please do not write below this line.

Q1	Q2	Q3	Q4	Q5	Q6	TOTAL
21	16	18	16	18	16	105

Question 1. Evaluate the limits, if they exist:

(a) $\lim_{x\to\infty}\left(1+\frac{1}{2x}\right)^{x}$

(b) $\lim_{x\to\infty}(\ln x)^{e^{-x}}$

(c) $\lim_{x\to\pi}\frac{\sin^2 x}{1+\cos 3x}$

Answer 1.

Question 2. Find the area of the region R in the **first quadrant** bounded by $y = x^2 + 1$, $y = 1$, and $x + y = 3$ by integrating
a) with respect to x
b) with respect to y.

Answer 2.

Question 3. Find the derivatives of the following functions.

a) $f(x) = x \sin^{-1}(2x) + \sec\left(3^{4x}\right)$

b) $f(x) = \cos^3\left(\tan^{-1}\left(x^3 - x\right)\right)^4$

c) $f(x) = \int_{x^2}^{a} \dfrac{t^3 dt}{\sqrt{t^2 + \ln t}}$

Answer 3.

Question 4.

a) By using logarithmic differentiation, find the derivative of

$$y = \frac{(4x+1)^3 \, x^x 2^{x^2}}{e^{x^3} \, (x^2-2)^4}$$

b) Find all values of x that make the slope of the graph $y = \tan^{-1}(3x)$ equal to 1.

Answer 4.

Question 5. Evaluate the following integrals

a) $\int x\sqrt{2x-3}dx$

b) $\int \dfrac{x^3 dx}{\sqrt{16+x^2}}$

c) $\int_1^4 (x\,|x-3|+2)\,dx.$

Answer 5.

Question 6. Let R be the region **in the first quadrant** bounded by the curve $y = 9x - x^3$ and the x-axis. Find the volume of the solid obtained by rotating R about
a) x-axis,
b) y-axis.

Answer 6.