ÇANKAYA UNIVERSITY
Department of Mathematics and Computer Science

MATH 155 Calculus for Engineering I

2^{nd} Midterm

August 4, 2008

13:40-15:10

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
18	21	15	16	15	20	105

1. Evaluate the following limits

$$\text{a)} \lim_{x\to+\infty} \left(e^x + x\right)^{1/x}, \qquad \text{b)} \lim_{x\to 0} \frac{e^x - 1}{\sin x}, \qquad \text{c)} \lim_{x\to 3^-} \left(\frac{1}{\ln\left(x-2\right)} - \frac{1}{x-3}\right)$$

2. For each of the following functions, calculate the derivative. Do not simplify your answers.

a) $y = \left(\dfrac{x}{x+9}\right)^{3x+2}$, b) $y = \ln \dfrac{\sin^{-1} x}{\sin x}$, c) $f(x) = \displaystyle\int_{\sqrt{x}}^{x^2} \frac{dt}{1+t+\sin t}$

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3. Given $f(x) = x^5 + 3x^3 + 2x + 1$,
a) show that f has an inverse $g(x)$.
b) compute $g'(7)$.

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4. Evaluate the following integrals

(a) $\displaystyle\int \frac{x^3 - 4x^2 + 3x - 1}{\sqrt{x}}\, dx$, (b) $\displaystyle\int x^3 \left(x^2 + 1\right)^{-1/2}\, dx$, (c) $\displaystyle\int_{\pi/4}^{\pi/3} \left(\sin\theta + \frac{1}{\sin^2\theta}\right)\, d\theta$

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5. Find the area bounded by the graphs $y = x^2$ and $y = 2 - x^2$ for $0 \leq x \leq 2$.

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6. Let R be the region bounded by the graphs of $y = x^2$ $(x \geq 0)$, $y = 2 - x$ and $x = 0$. Compute the volume of the solid formed by revolving R about

a) the x-axis

b) the y-axis.
