



ÇANKAYA UNIVERSITY
Department of Mathematics and Computer Science

MATH 155 Calculus for Engineering I

1st Midterm

November 13, 2006

17:40-19:20

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.
- Do not use L'Hopital's rule.

GOOD LUCK!

Please do not write below this line.

Q1	Q2	Q3	Q4	Q5	Q6	TOTAL
20	15	15	15	15	25	105

Question 1. Evaluate the limits, if they exist (**Do not use L'Hopital's rule**).

(a) $\lim_{x \rightarrow 2^-} \frac{x-2}{|2-x|} + x.$

(b) $\lim_{x \rightarrow -\infty} \sqrt{x^2 - 3x} + x$

(c) $\lim_{x \rightarrow \pi} \frac{1 - \cos x}{x^2}$

(d) $\lim_{x \rightarrow 0} x \cot(3x)$

Answer 1.

Question 2. Let

$$f(x) = \begin{cases} ax - 2 & \text{if } x < 1 \\ b & \text{if } x = 1 \\ x^2 & \text{if } x > 1 \end{cases}$$

- a) Find the values of a and b so that the function $f(x)$ is continuous everywhere.
b) Is $f(x)$ differentiable at $x = 1$? Justify your answer.
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Answer 2.

Question 3. Find the derivatives of the following functions. Do not simplify your answers

a) $f(x) = x^2\sqrt{x} + \frac{1}{\sqrt[3]{x}} - \csc(2x)$

b) $f(x) = x \cos(x^4 + 2x) + \sec\left(\frac{x+2}{3x-1}\right)$

c) $f(x) = \sin^3\left(\sqrt{\tan 3x + \frac{2}{x}}\right)$

Answer 3.

Question 4. Consider the curve given

$$2x \sin(xy) = x^2 + 1$$

- a) Find $dy/dx = y'$.
- b) Write an equation of the tangent line at the point $P_0(1, \pi/2)$.

Answer 4.

Question 5. Find the absolute extrema of $f(x) = x^5 - 5x^3$ on $[-2, 1]$.

Answer 5.

Question 6. Sketch the graph of $f(x) = \frac{x}{(x+2)^2}$.

Be sure to indicate the domain of f , all intercepts, all asymptotes, extrema, inflection points, intervals of increase/decrease and intervals of concavity.

Answer 6.