

MATH 1311 FALL 2015

CALCULUS I

FIRST MIDTERM EXAM

FRIDAY, SEPTEMBER 25

YOUR NAME (PLEASE PRINT):

Instructions: This is a closed book, closed notes exam. **Use of calculators or other electronic devices such as cell phones, mp3 players, etc. is not permitted.** Unless indicated otherwise, you must justify all of your answers to receive credit. Unjustified answers and/or disorganized or otherwise illegible work will receive partial credit at best. Notation is important, and points will be deducted for incorrect use. Please do all of your work on the paper provided.

The Honor Code requires that you neither give nor receive any aid on this exam.

Please indicate that you have read and understood these guidelines by signing your name in the space provided:

Pledged: _____

Do not write below this line

Problem	1	2	3	4	5	6	7
Points	8	20	8	8	20	12	10
Score							

Total:_____

1. For the function f whose graph is shown below, find each limit or state that it does not exist. You do not need to justify your answers.

a. $\lim_{x \rightarrow -2^-} f(x)$

b. $\lim_{x \rightarrow 3^-} f(x)$

c. $\lim_{x \rightarrow 3} f(x)$

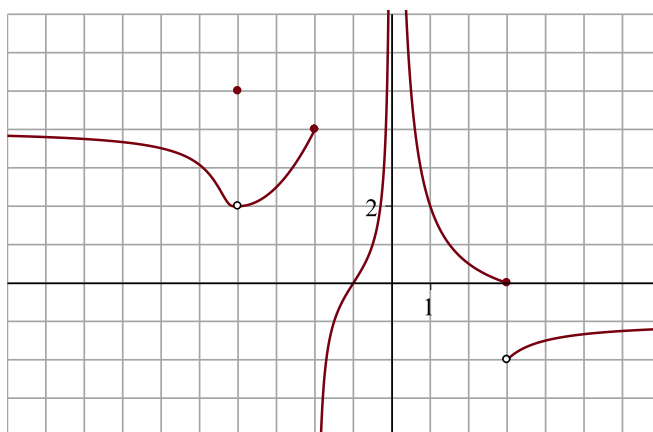
d. $\lim_{x \rightarrow -4} f(x)$

e. $\lim_{x \rightarrow 0} f(x)$

f. $\lim_{x \rightarrow -2^+} f(x)$

g. $\lim_{x \rightarrow \infty} f(x)$

h. $\lim_{x \rightarrow -\infty} f(x)$



2. Evaluate the limit, if it exists.

a. $\lim_{x \rightarrow 9^-} \frac{9x - x^2}{x^2 - 18x + 81}$

b. $\lim_{t \rightarrow 0} \left(\frac{1}{t\sqrt{t+1}} - \frac{1}{t} \right)$

c. $\lim_{x \rightarrow -\infty} \frac{\sqrt{3x^2 - 9}}{2x - 6}$

d. $\lim_{\theta \rightarrow 0} \frac{\tan 5\theta}{\theta + \sin 2\theta}$

3. Determine the value of a so that the function

$$q(x) = \begin{cases} \frac{6 - 2|x|}{x + 3} & \text{if } x \neq -3, \\ a & \text{if } x = -3 \end{cases}$$

is continuous for all x .

4. Show that the equation $x^2 + 10 \sin x = 1000$ has a solution.

5. Differentiate.

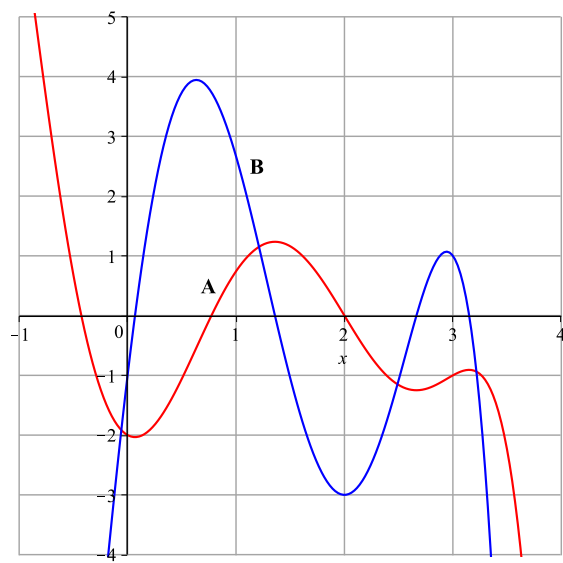
a. $y = \frac{\cot z}{1 + \cos z}$

b. $f(x) = (5x^3 + 2x) \left(e^x - \frac{3}{x} \right)$

c. $R(t) = \frac{t - \sqrt{t}}{\sqrt[3]{t}}$

d. $w = \frac{1 - x \sin x}{x + 1}$

6. The figure below shows the graphs of a function f and its derivative.



- a. Which curve is the graph of f and which is the graph of f' ? You do not need to justify your answer.
- b. Find an equation for the tangent line to $y = f(x)$ at the point where $x = 3$.
- c. Let $F(x) = f(x)f'(x)$. Compute $F'(2)$.

7. If $g(x) = \frac{1}{2x-3}$, use the definition of the derivative to find $g'(1)$.