

# EXAM 1

Score: \_\_\_\_\_ out of 100

Math 201 - Calculus I

Name: \_\_\_\_\_

**Read all of the following information before starting the exam:**

- You have 50 minutes to complete the exam.
- Show all work, clearly and in order, if you want to get full credit. Please make sure you read the directions for each problem. I reserve the right to take off points if I cannot see how you arrived at your answer (even if your final answer is correct).
- Please 



 or otherwise indicate your final answers.
- Please keep your written answers brief; be clear and to the point. I will take points off for rambling and for incorrect or irrelevant statements.
- This test has 6 problems and is worth 100 points. It is your responsibility to make sure that you have all of the pages!
- Good luck!

1. Calculate the following limits. If the limit is  $\infty$  or  $-\infty$  clearly indicate this. Otherwise, for limits that do not exist, write D.N.E.

(a)  $\lim_{x \rightarrow 4} \frac{x^2 - 2x - 8}{x^2 - 16}$

**answer:**

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(b)  $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{x}$

**answer:**

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(c)  $\lim_{x \rightarrow 0} \left( \frac{1}{x} - \frac{1}{x^2 + x} \right)$

**answer:**

(d)  $\lim_{\theta \rightarrow \frac{\pi}{6}} \frac{2 \sin(\theta) + \tan(6\theta)}{\cos(12\theta)}$

answer:

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(e)  $\lim_{x \rightarrow 2} e^{(x^2 + 2x - 8)}$

answer:

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(f)  $\lim_{t \rightarrow -3^-} \frac{t + 3}{|t + 3|}$

answer:

2. Let  $f(x) = \frac{x^2 - 1}{x^2 + 3x + 2}$

(a) Find the vertical asymptote(s) of  $f$ . Justify completely.

**answer:**

(b) Find the horizontal asymptote(s) of  $f$ . Justify completely.

**answer:**

3. Use the Squeeze Theorem to show that  $\lim_{x \rightarrow 0} 2x^6 \cos\left(\frac{5}{x^{10}}\right) = 0$ .

4. Use the  $\epsilon, \delta$  definition of the limit to show that  $\lim_{x \rightarrow \frac{1}{2}} (2x + 1) = 2$ .

5. Where is the function  $f(x) = \frac{\tan^{-1}(x^2 + 1) - \ln(x - 5)}{e^{(\sin(x) + \cos(x))}}$  continuous?.

**answer:**

6. Use the Intermediate Value Theorem to show that the equation  $\cos(5x) = 8x^3$  has a root in the interval  $(0, \frac{1}{2})$ .