

MATH 241, Spring 2009
Exam 1: March 11

NAME _____ Discussion section time _____

1	2	3	4	5	6	7	8	Total

Arrange your work as clearly and neatly as possible, and cross out incorrect work. **Unless otherwise noted, you must justify all answers to receive full credit.** You may not use calculators, notes, or any other kinds of aids.

For this exam, you must use a limit formula to compute any derivative.

1. (6 points each) Let $f(x) = e^{2x} + 1$.

- (a) Find a formula for $f^{-1}(x)$. (b) Find the domain of f and the domain of f^{-1} .

2. (12 points) Solve $\ln(x) - \ln(x - 1) = \ln(2)$ for x .

3. (12 points) Find the exact value of $\arccos \left[\cos \left(\frac{5\pi}{4} \right) \right]$.

Reminder: For this exam, you must use a limit formula to compute any derivative.

4. (4 points each) Let $f(x) = \begin{cases} \sqrt{|1+x|} & \text{if } x < 0, \\ 1-x & \text{if } x \geq 0. \end{cases}$

Evaluate each limit, or write DNE if it does not exist.

(a) $\lim_{x \rightarrow 0^-} f(x)$

(b) $\lim_{x \rightarrow 0^+} f(x)$

(c) $\lim_{x \rightarrow 0} f(x)$

Reminder: For this exam, you must use a limit formula to compute any derivative.

5. (12 points) Find the limit, or write DNE if it does not exist.

$$\lim_{x \rightarrow 1^-} \frac{x^2 - 16}{x^2 - 5x + 4}$$

Reminder: For this exam, you must use a limit formula to compute any derivative.

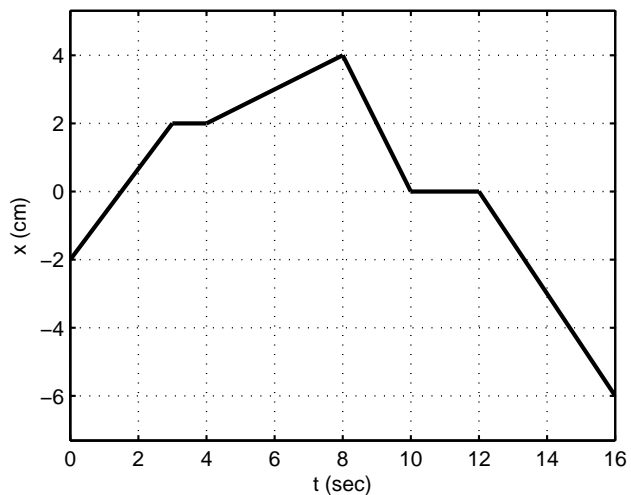
6. (8 points each) Find each limit, or write DNE if it does not exist.

$$(a) \lim_{x \rightarrow \infty} \frac{1}{\ln(x)}$$

$$(b) \lim_{x \rightarrow \infty} \frac{4x^2 - 16}{x^4 + 1}$$

Reminder: For this exam, you must use a limit formula to compute any derivative.

7. (4 points each) A particle moves horizontally in a straight line according to the position function $x(t)$, whose graph is shown here.



- What is the average velocity over $0 \leq t \leq 16$?
- At what time(s), if any, is the particle moving to the right?
- At what time(s), if any, is the instantaneous velocity undefined?

Reminder: For this exam, you must use a limit formula to compute any derivative.

8. (12 points) Find the equation of the line tangent to $y = 3x^2$ at the point $(1, 3)$.

Reminder: For this exam, you must use a limit formula to compute any derivative.