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) \( \lim_{x \to 0^-} f(x) \)  
(b) \( \lim_{x \to 0^+} f(x) \)  
(c) \( \lim_{x \to 0} f(x) \)

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.

\[ \lim_{x \to 1^-} \frac{x^2 - 16}{x^2 - 5x + 4} \]

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.

\[
\text{(a) } \lim_{x \to \infty} \frac{1}{\ln(x)} \quad \text{(b) } \lim_{x \to \infty} \frac{4x^2 - 16}{x^4 + 1}
\]

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.

(a) What is the average velocity over $0 \leq t \leq 16$?
(b) At what time(s), if any, is the particle moving to the right?
(c) 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 \((1, 3)\).