

Algebra and Calculus: Quiz 7

Name/NetID: _____

Complete all problems.

1. For **multiple choice** problems, circle the letter corresponding to the correct answer.
2. For **true or false** problems, indicate whether you believe the statement is true or false and put a box around your answer (as shown).
3. For **free response** problems, **show all work** and put a box around your final answer.

Good luck!

For the first two questions, answer **true or false**

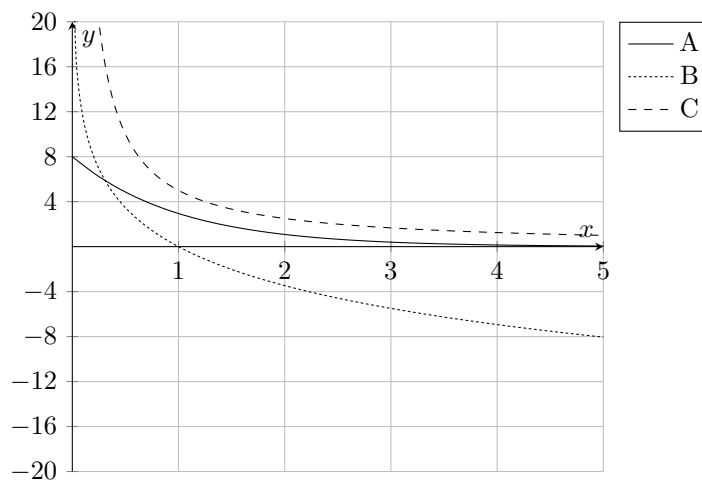
1. $\log_a(b) = x \implies b = a^x$
2. The range of e^x is the same as the domain of $\ln(x)$.

The next five questions are multiple choice.

3. What is the value of $\log_{10}\left(\frac{1}{100}\right)$?
 - (a) -2
 - (b) -1
 - (c) 0
 - (d) 1
 - (e) 2
4. If $\log_2(x) = \log_4(x^n)$ for all $x > 0$, what is n ?
 - (a) -2
 - (b) -1
 - (c) 0
 - (d) 1
 - (e) 2

Hint: Pick a “smart” value of x and use the fact that $\log_a(a) = 1$.

5. Below is a graph of three functions, with each given one of the labels A, B, or C.



The functions are

- $f(x) = -5\ln(x)$
- $g(x) = 8e^{-x}$
- $h(x) = \frac{5}{x}$

Which labels correspond to which functions?

- (a) $A = f(x)$, $B = g(x)$, $C = h(x)$
- (b) $A = h(x)$, $B = g(x)$, $C = f(x)$
- (c) $A = g(x)$, $B = f(x)$, $C = h(x)$
- (d) $A = f(x)$, $B = h(x)$, $C = g(x)$
- (e) $A = g(x)$, $B = h(x)$, $C = f(x)$

6. What is the domain of $f(x) = \frac{\log(5-x)}{\sqrt{x^2-1}}$?

- (a) $[1, 5]$
- (b) $(-\infty, -1) \cup (1, 5)$
- (c) $[1, 5)$
- (d) $(-\infty, -1] \cup [1, 5)$
- (e) $(5, \infty)$

7. What are the horizontal asymptotes of $\frac{e^{-x}}{2e^{-x} + 1}$?

(a) $y \rightarrow \frac{1}{2}$ as $x \rightarrow -\infty$ and $y \rightarrow 0$ as $x \rightarrow \infty$

(b) $y \rightarrow 0$ as $x \rightarrow -\infty$ and $y \rightarrow \frac{1}{2}$ as $x \rightarrow \infty$

(c) $y \rightarrow \frac{1}{2}$ as $x \rightarrow \pm\infty$

(d) $y \rightarrow 0$ as $x \rightarrow \pm\infty$

(e) $y \rightarrow 2$ as $x \rightarrow -\infty$ and $y \rightarrow 0$ as $x \rightarrow \infty$

Hint: What is the end behavior of e^{-x} ?

The next question is a free response question.

8. Use the laws of logarithms to expand the following expression as completely as possible:

$$\log \left((3x + 1) \sqrt{\frac{x^2 - 1}{x^2 + 4x + 4}} \right)$$