Logarithms and Exponentials Test Questions:

1. For all $x$, $\ln(e^x) = x$.  
   True or False

2. $e^a e^b = (e^a)^b$ is true for all values of $a$ and $b$.  
   True or False

3. If $M > 0$ and $N > 0$, then
   \[ \ln \left( \frac{M}{N} \right) = \ln M - \ln N. \]
   True or False

4. If $\log_3 x + \log_3(x - 6) = 3$, then
   A. $x = -3$ only  
   B. $x = 9$ only  
   C. $x = 9$ or $x = -3$  
   D. $x = 16.5$ only

5. Let $f(x) = \ln(x^2 + 1)$. Consider the following four statements about the graph of $f$:
   I. It is symmetric with respect to the $x$-axis.
   II. It is symmetric with respect to the $y$-axis.
   III. It is always increasing.
   IV. It is always decreasing.
   How many of these four statements are true?
   A. one  
   B. two  
   C. three  
   D. four

6. Let $f(x) = -e^{-3x}$. Consider the following four statements about the graph of $f$:
   I. It is symmetric with respect to the $x$-axis.
   II. It is asymptotic to the $x$-axis.
   III. It is always increasing.
   IV. It is always decreasing.
   How many of these four statements are true?
   A. one  
   B. two  
   C. three  
   D. four

7. If $4^{3x-1} = 8^{3x+3}$, then $x =
   A. \frac{11}{3}$  
   B. 2  
   C. $-\frac{11}{3}$  
   D. $-\frac{7}{3}$