Math 110 Common Exam #1

September 25, 2024

Time: 1 hour and 25 minutes

Instructions: Show all work for full credit.
No outside materials or calculators allowed.

Extra Space: Use the backs of each sheet
for extra space. Clearly label when doing so.

Name: _____

ID #: _____

Instructor/Section: _____

"I pledge by my honor that I have abided by the NJIT Academic Integrity Code."

_____ (Signature)

Problem		Score
1		
2		
3		
4		
5		
6		
7		
8		

1. Simplify the following fully (4 pts each)

   a. $\frac{\sqrt{8}+\sqrt{8}}{\sqrt{2}}$

   b. $\frac{log_2 64}{log_2 4}$

   c. $27^{\frac{2}{3}}$

   d. $(7^x)^2 \cdot (7^2)^{-x}$

2. True or False (no work required) (2 pts each)

   a. $y = 1^x$ is an exponential function

   b. The domain of the exponential function, $y = 4^x - 2$, is all real numbers

   c. $log_b C - log_b D = \frac{log_b C}{log_b D}$

   d. $\ln\left(\frac{1}{x}\right) = -\ln x$

3. Solve: (4 pts each)

a. $49^{2x} = \frac{1}{7}$

b. $\ln(3x + 8) = \ln(2x + 2) + \ln(x - 2)$

c. $e^{x-1} = 9$

d. $3^{2x-1} = 5^{x+2}$

e. $\frac{e^x}{e^{-x}} = 7$

4. Graph (6 pts each)

a. $y = -2 - e^{-x}$

b. $y = log_3[(x-3)^3]$

c. $y = \begin{cases} \ln(-x) , & x < -1 \\ 3e^x , & x \geq 0 \end{cases}$

5. Consider the function $f(x) = a2^{kx}$

   a. Find the values of a and k if $f(0) = 10\ and\ f(3) = 640$ (6 pts)

   b. Find the inverse of the function you found in part a. (4 pts)

6. Solve for y: $\ln y = \ln x - \ln(x^2 y) - 2\ln y$ (6 pts)

7. Two pulleys are connected by a belt so that when one pulley rotates, the linear speeds of the belt and both pulleys are the same. The radius of the smaller pulley is 2 inches and the radius of the larger pulley is 5 inches. A point on the belt travels at a rate of 600 inches per minute. Find the angular speed of both the **large pulley** and the **small pulley**. (6 pts)

8. Find the following if they exist or explain why an answer does not exist: (4 pts each)

   a. The supplement of an angle measuring $\frac{2\pi}{5}$ radians

   b. The angle between 0 and $360°$ that is coterminal with $823°$

   c. The measure of the arc length if a circle has radius 3 feet and a central angle measuring $25°$

   d. The complement of an angle measuring $-35°$