Math 220  

Quiz 2  

Spring 2012

Name  

Key  


- No calculators allowed.  
- Show sufficient work to justify each answer.  
- You have 15 minutes for this quiz.

1. (3 points) Find the equation of an exponential function, \( f(x) = ca^x \), which passes through the points \((1, 10)\) and \((2, 4)\)

\[
\begin{align*}
10 &= ca^1 \\
4 &= ca^2
\end{align*}
\]

\[
10 = c \cdot \frac{16}{a} \\
4 = c \cdot a^2
\]

\[
4 = \frac{16}{a} \cdot a^2 \\
4 = 16a \\
a = \frac{4}{16} = \frac{1}{4}
\]

So \( a = \frac{1}{4} \), \( c = \frac{16}{2/5} = 25 \)

\[
y = 25 \left( \frac{2}{5} \right)^x
\]

2. (3 points) Solve for \( x \).

\[
e^{2\ln(x+3)} = 4
\]

\[
e^{\ln((x+3)^2)} = 4
\]

\[(x+3)^2 = 4
\]

\[x^2 + 6x + 9 = 4
\]

\[x^2 + 6x + 5 = 0
\]

\[(x+1)(x+5) = 0
\]

\[x = -1 \text{ or } x = -5
\]

\[x = -5 \text{ is not in the domain of } e^{2\ln(x+3)}
\]

So the only solution is \[x = -1\]
3. (2 points) Given that \( f(x) = e^{\sqrt{x-5}} \), find an equation for \( f^{-1}(x) \).

\[
\begin{align*}
y &= e^{\sqrt{x-5}} \\
\ln y &= \sqrt{x-5} \\
(\ln y)^2 &= x - 5 \\
x &= (\ln y)^2 + 5
\end{align*}
\]

\[f^{-1}(x) = (\ln x)^2 + 5\]

4. (2 points) Find the value of the following expression.

\[3 \log_4 2 + \log_4 2\]

\[
= \log_4 (2^3) + \log_4 2 \\
= \log_4 (8 \cdot 2) \\
= \log_4 (16) \\
= 2
\]