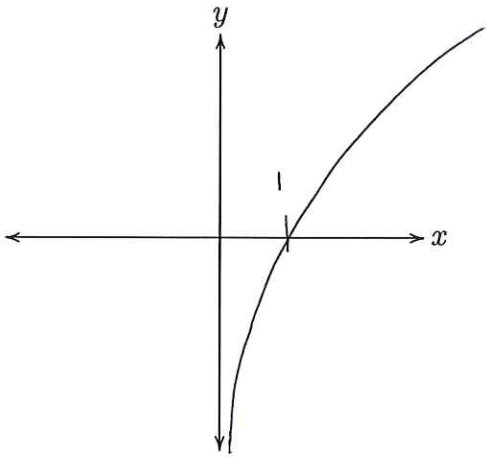
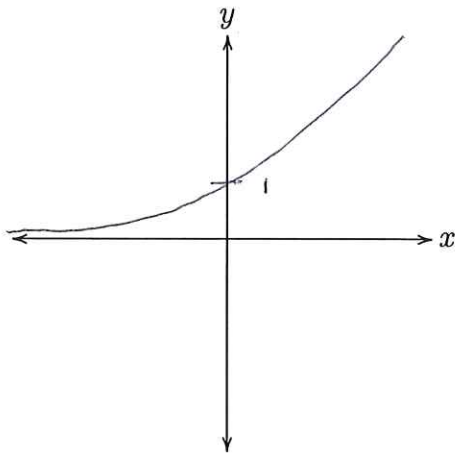
Math 226 Sections 7 and 10 Quiz 1 Solutions 8/30/17

Name:_____

1. Sketch a graph of $y = \ln(x)$.
   Mark any x- or y-intercepts.



2. Sketch a graph of $y = e^x$.
   Mark any x- or y-intercepts.



3. Find the inverse function.

$$y = \frac{e^x}{1+3e^x}$$

$$y(1+3e^x) = e^x$$

$$y + 3ye^x = e^x$$

$$3ye^x - e^x = -y$$

$$(3y-1)e^x = -y$$

$$e^x = \frac{-y}{3y-1}$$

$$x = \ln\left(\frac{-y}{3y-1}\right)$$

$$\boxed{f^{-1}(x) = \ln\left(\frac{-x}{3x-1}\right)}$$

4. Evaluate $\int \frac{\sec^2(\ln 2x)}{x} dx$

$= \int \sec^2 u \, du = \tan u + C$

$u = \ln 2x$

$du = \frac{2}{2x} dx = \frac{1}{x} dx$

$= \boxed{\tan(\ln 2x) + C}$

5. Use logarithmic differentiation to find the derivative of $y = \frac{(x^4+1)^3}{\sqrt{x}\cos^2(x)}$

$\ln y = \ln\left(\frac{(x^4+1)^3}{x^{\frac{1}{2}}\cos^2(x)}\right)$

$\ln y = 3\ln(x^4+1) - \frac{1}{2}\ln x - 2\ln(\cos x)$

$\frac{y'}{y} = \frac{3 \cdot 4x^3}{x^4+1} - \frac{1}{2x} - \frac{2(-\sin x)}{\cos x}$

$\boxed{y' = \left(\frac{12x^3}{x^4+1} - \frac{1}{2x} + 2\tan x\right)\left(\frac{(x^4+1)^3}{\sqrt{x}\cos^2 x}\right)}$