1. (3 pts) Use the chain rule to find the derivative of

$$f(x) = \arctan(\ln(x))$$

$$f^{-1}(x) = \frac{1}{1 + \text{stuff}^2} \cdot \text{stuff}'$$

$$= \frac{1}{1 + \ln(x)^2} \cdot \frac{1}{x}$$

Good!

2. (3 pts) Given that

$$\frac{d}{dx}(\arcsin(x)) = \frac{1}{\sqrt{1-x^2}} = (\text{stuff})^{-1/2}$$

compute the derivative of $\arccos(x)$ using the chain rule, based on the fact that

$$\arccos(x) = \arcsin(-x) + \frac{\pi}{2}.$$

$$\arccos(x)' = \frac{-1}{\sqrt{1 - \text{stuf}^2}} \cdot \text{stuff}'$$

$$= \frac{-1}{\sqrt{1-(-x)^2}}$$

but you're right here - stuff $= -x$ for this one!

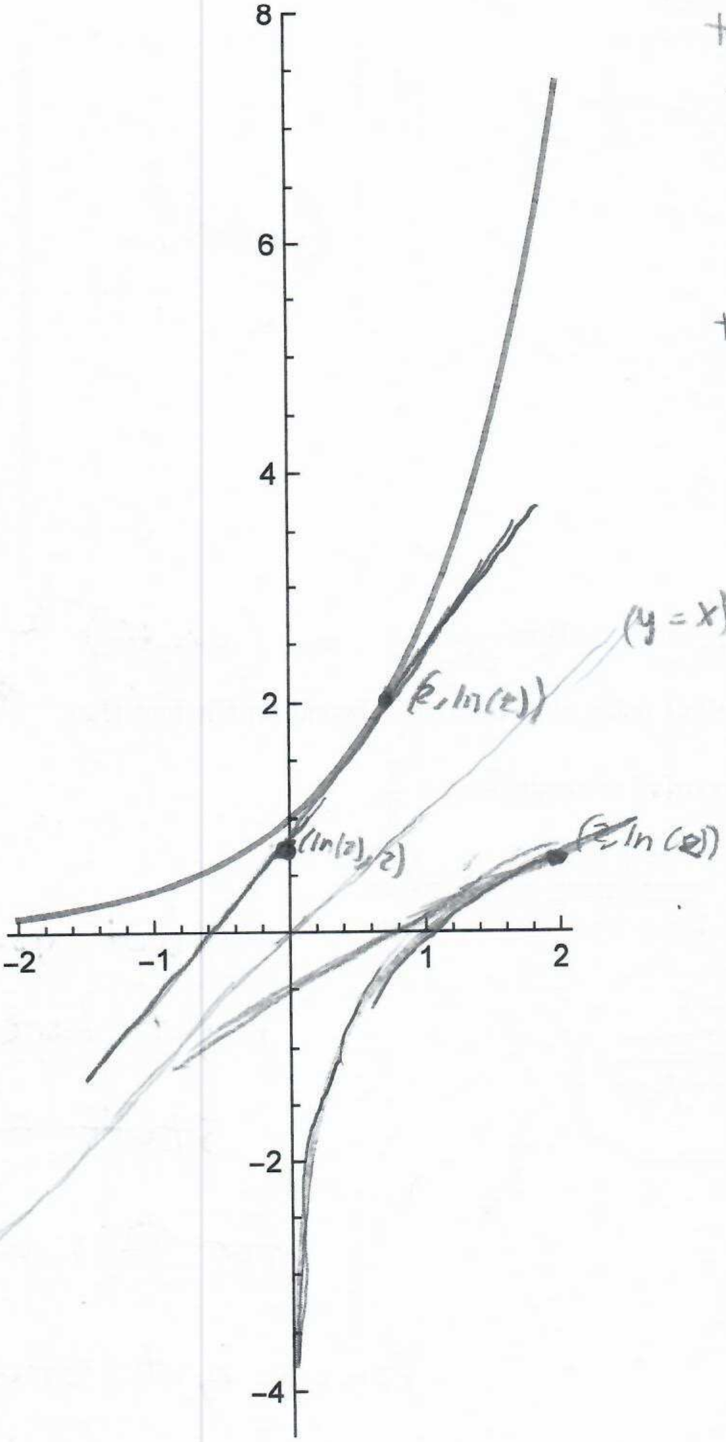
You've got stuff down! :)

3. (4 pts) Below are the graphs of $f(x) = e^x$ and its inverse, $f^{-1}(x) = \ln(x)$. A point on the graph of $f$ is $(\ln(2), 2)$, and the corresponding point on the graph of $f^{-1}$ is $(2, \ln(2))$.

   a. Find tangent lines to each function, but at $x = \ln(2)$ for $f$, and at $x = 2$ for $f^{-1}$.

   b. Draw the lines into the graph.

   c. Explain the relationship in their appearance.




tangent line at $x = \ln(2)'$ for $f(x) = e^x$

slope $= e^{\ln(2)} = 2$ = the function value.

$y - 2 = 2(x - \ln(2))$

Good.

tangent line at $x = 2$ for $f^{-1}(x) = \ln(x)$

$y - \ln(2) = \frac{1}{2}(x - 2)$

Base on their appearance you can see how the two tangents lines are inverses of each other creating a symmetry about the line $y = x$.