5.4 Recap HW

43 $y = \dfrac{2}{e^x + e^{-x}}$ $y = 2(e^x + e^{-x})^{-1}$

$y' = -2(e^x + e^{-x})^{-2}(e^x - e^{-x})$

$y' = \dfrac{-2(e^x - e^{-x})}{(e^x + e^{-x})^2}$

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$y = x^2e^x - 2xe^x + 2e^x$ (1, e)

$y' = x^2e^x + 2xe^x - 2xe^x - 2e^x + 2e^x$

$y' = e + 2e - 2e - 2e + 2e$

$y' = e$

$e = e(1) + b$

$-e \quad - e$

$0 = b$

$y = ex$

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5.3

$y = e^{-x}\ln x$ $(1,0)$

$y = e^{-x}\left(\frac{1}{x}\right) + -e^{-x}\ln x$

$y' = e^{-x}\left(\frac{1}{x} - \ln x\right)$

$y' = e^{-1}\left(1 - \cancel{\ln(1)}^{\,0}\right)$

$y' = \frac{1}{e}$ or e^{-1}

$0 = e^{-1}(1) + b$

$-e^{-1} \quad -e^{-1}$

$-e^{-1} = b$

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

or $y = e^{-1}x - e^{-1}$

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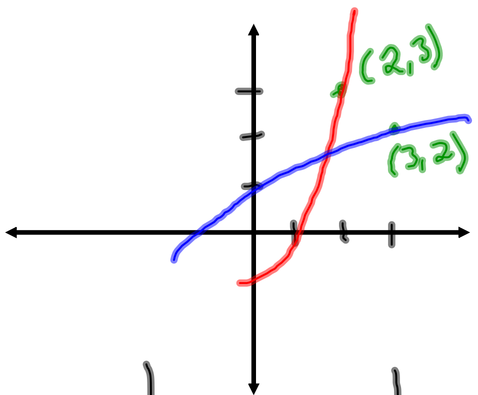
Ex 4 Evaluating the Derivative

$f(x) = \frac{1}{4}x^3 + x - 1$

a) $f^{-1}(3) = 2$

if $f(2) = 3$



b) $(f^{-1})'(x)$ when $x=3$

$(f^{-1})'(3) = \frac{1}{f'(f^{-1}(3))} = \frac{1}{f'(2)} = \frac{1}{\frac{3}{4}(2)^2+1} = \frac{1}{4}$

$\boxed{\frac{1}{f'(f^{-1}(x))}}$

$f'(x) =$
$3/4x^2 + 1$

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☆ Graphs of inverse functions have reciprocal slopes

Let $f(x) = x^2$ let $f^{-1}(x) = \sqrt{x}$ $x^{1/2}$ show that the slopes of the graphs of f and f^{-1} are reciprocals at each point.

Ex 5 (2,4) and (4,2)

$f'(x) = 2x$ $\quad (f^{-1})'(x) = \dfrac{1}{2\sqrt{x}}$

① Take Der'v of Both

(2,4)

$f'(2) = 2(2)$
$= 4$ ✓

(4,2)

$\dfrac{1}{2(\sqrt{4})} = \dfrac{1}{4}$ ✓

Ex 6 (3,9) and (9,3)

$f'(3) = 2(3)$
$= 6$

$(f^{-1})'(x) = \dfrac{1}{2\sqrt{9}}$
$= \dfrac{1}{6}$

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