APCalculus AB D05 EASY Practice
No Calculator

KEY

In #1 - #6, give the derivatives:

1. $D_x(\arcsin(x)) = \boxed{\dfrac{1}{\sqrt{1-x^2}}}$

2. $D_x(\arccos(x)) = \boxed{-\dfrac{1}{\sqrt{1-x^2}}}$

3. $D_x(\arctan(x)) = \boxed{\dfrac{1}{1+x^2}}$

4. $D_x\left(\arctan\left(\frac{1}{x}\right)\right) = \dfrac{1}{1+\left(\frac{1}{x}\right)^2} \cdot D_x\left(\overset{x^{-1}}{\frac{1}{x}}\right) = \dfrac{1}{1+\frac{1}{x^2}}\left(-x^{-2}\right) = \dfrac{1}{1+\frac{1}{x^2}}\left(-\dfrac{1}{x^2}\right)$

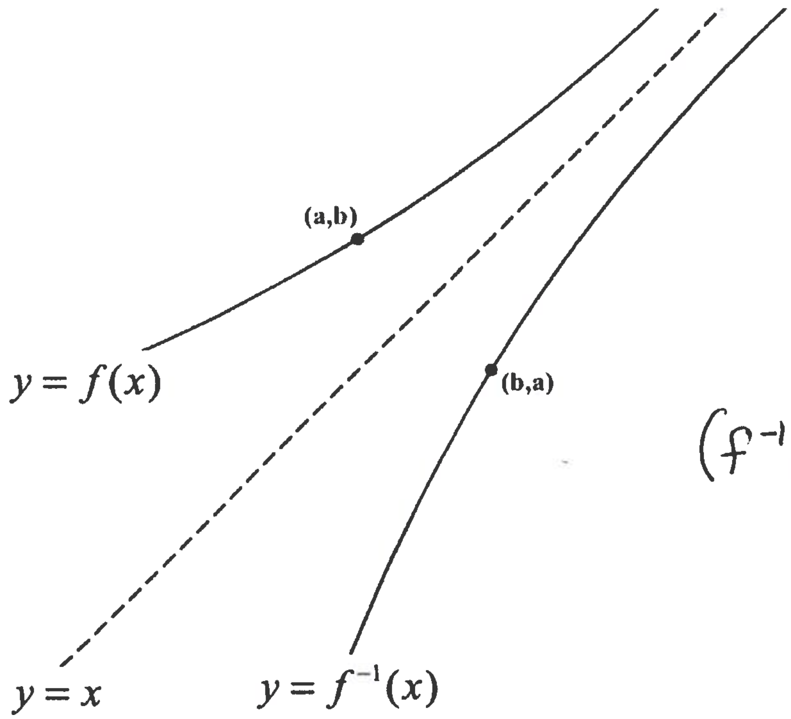
$= \boxed{-\dfrac{1}{x^2+1}}$.

5. $D_x(\log_3(x)) = \dfrac{1}{x\ln(3)}$

6. $D_x(\log_3(5^x)) = \dfrac{1}{5^x\ln(3)} \cdot D_x(5^x) = \dfrac{1}{5^x\ln(3)} \cdot 5^x\ln(5) = \boxed{\dfrac{\ln(5)}{\ln(3)}}$

(over)

7. For the following situation, give an expression for $(f^{-1})'(b)$, "the derivative of the inverse function of f at $x = b$," <u>in terms of the derivative of function f.</u>



$$(f^{-1})'(b) = \frac{1}{f'(f^{-1}(b))} = \boxed{\frac{1}{f'(a)}}$$

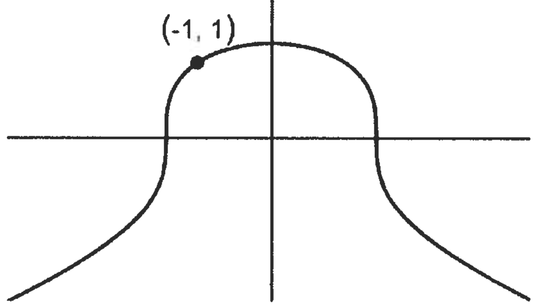
8. Find the values c and m in the following expressions:

$g\left(\frac{\pi}{4}\right) = 1 \qquad g'\left(\frac{\pi}{4}\right) = 2 \qquad (g^{-1})(1) = \ c \qquad (g^{-1})'(1) = \ m$

$g^{-1}(1) = \boxed{\pi/4 = c}$

$$(g^{-1})'(1) = \frac{1}{g'(g^{-1}(1))} = \frac{1}{g'(\pi/4)} = \boxed{\frac{1}{2}} = m$$

9. Find the slope of the tangent line to the curve $x^2 + y^3 = 2$ at $(-1,1)$.



$x^2 + y^3 = 2$ implies function $y = f(x)$.
We will not solve for $f(x)$ explicitly.
We do know that $f(-1) = 1$

Reminders:

$D_x(x) = 1$

$D_x(y) = \frac{dy}{dx} = y'$

$D_x(y^3) = (3y^2) \cdot D_x(y)$

$= 3y^2 \cdot \frac{dy}{dx}$

$D_x(x^2 + y^3) = D_x(2)$

$D_x(x^2) + D_x(y^3) = D_x(2)$

$2x + \underbrace{D_x(y^3)}_{\text{Chain Rule}} = 0$

$2x + 3y^2 \cdot \frac{dy}{dx} = 0$

$3y^2 \cdot \frac{dy}{dx} = -2x$

$\frac{dy}{dx} = \frac{-2x}{3y^2}$

$\left.\frac{dy}{dx}\right|_{(-1,1)} = \frac{-2(-1)}{3(1)^2} = \boxed{\frac{2}{3}}$ slope of TL at $(-1,1)$