Due date: _____ **Name:** _____

Getting Ready for Derivatives (Part 5)

Notes

Recall the following trig identities:
$\sin^2 x + \cos^2 x = 1$
$\sin(x+y) = \sin x \cos y + \cos x \sin y$
$\cos(x+y) = \cos x \cos y - \sin x \sin y$

Also, recall that for logarithms and exponentials:
$e^{\ln x} =$ x and $\ln e^x =$ x

There's also the change of base formula for logarithms:
$\log_b a = \frac{\log_c a}{\log_c b}$
For example, this allows us to convert from any base to natural logarithms: $\log_b a = \frac{\ln a}{\ln b}$

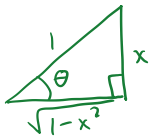
Lastly, it's time to memorize the definitions of $\sinh x$ and $\cosh x$:
$\sinh x =$ $\frac{e^x - e^{-x}}{2}$
$\cosh x =$ $\frac{e^x + e^{-x}}{2}$

Notes

ex: Rewrite $\cos(\underbrace{\sin^{-1} x}_{\theta})$ as an algebraic expression.

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

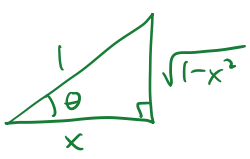
$\sin^{-1} x = \theta$
$\sin\theta = x = \frac{x}{1}$



1. Rewrite $\sin(\underbrace{\cos^{-1} x}_{\theta})$ as an algebraic expression.

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

$\cos^{-1} x = \theta$
$\cos\theta = x = \frac{x}{1}$



2. Rewrite $\tan(\underbrace{\sin^{-1} x}_{\theta})$ as an algebraic expression.

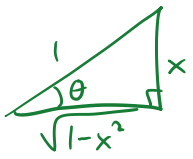
$\tan(\sin^{-1}x)$

$= \tan\theta$

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

$\sin^{-1}x = \theta$

$\sin\theta = x = \dfrac{x}{1}$



Practice at home

3. Try to fill in the following from memory.
   a) $\sin^2 x + \cos^2 x =$ 1
   b) $\sin(x+y) =$ sin x cos y + cos x sin y
   c) $\cos(x+y) =$ cos x cos y − sin x sin y
   d) $e^{\ln x} =$ x
   e) $\ln e^x =$ x
   f) $\log_b a =$ $\dfrac{\log_c a}{\log_c b}$ (Change of base formula)
   g) $\sinh x =$ $\dfrac{e^x - e^{-x}}{2}$ (Definition of $\sinh x$)
   h) $\cosh x =$ $\dfrac{e^x + e^{-x}}{2}$ (Definition of $\cosh x$)

4. Rewrite $\sin(\underbrace{\tan^{-1} x}_{\theta})$ as an algebraic expression.

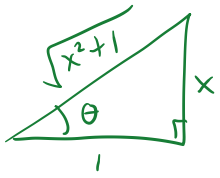
$\sin(\tan^{-1}x)$

$= \sin\theta$

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

$\tan^{-1}x = \theta$

$\tan\theta = x = \dfrac{x}{1}$



5. Rewrite $\cos(\underbrace{\sin^{-1} x}_{\theta})$ as an algebraic expression.

$\cos(\sin^{-1}x)$

$= \cos\theta$

$= \dfrac{\sqrt{1-x^2}}{1}$

$= \boxed{\sqrt{1-x^2}}$

$\sin^{-1}x = \theta$

$\sin\theta = x = \dfrac{x}{1}$