Name: _____

CLASSWORK 59

1. a) Use the "rule" to find the slope of $y = 1/2x^3$ at $x = 2$

b) Use intervals near $x = 2$ to show that this answer makes sense.
The point you are finding the slope with is (2, 4)

x	f(x)	Δx (from pt (2, 4))	Δy (from pt (2, 4))	Δy/Δx
2.5				
2.1				
2.01				
2.001				
2 + h				

c) Use the definition of the derivative to show that the rule is correct for $y = 1/2x^3$

2. a) Draw a graph to show that the derivative of $y = \sin x$ is $\cos x$.

b) Use the calculator to show that the derivative of $y = \sin x$ is $y = \cos x$.
(Hint: Make $Y_2 = nDeriv(Y_1, x, x)$

c) Make a guess for the derivative of $y = x^2 \cdot \sin x$

d) Use the calculator to see if your answer is right. Put $y = x^2 \cdot \sin x$ into Y1 and your guess into Y@, and also have the calculator find the derivative of $y = x^2 \cdot \sin x$ in Y3.

Does your answer seem correct?

For the following problems, $f(x) = 2x$, $g(x) = x^3$, and $h(x) = 1/x$

3.   a) $f'(x) =$ b) $g'(x) =$

    c) Let's say there's a function $k(x) = f(x) \cdot g(x)$.   What is $k(x)$?

     What is $k'(x)$?

4.   a) $g'(x) =$ b) $h'(x) =$

    c) Let's say there's a function $k(x) = g(x) \cdot h(x)$.   What is $k(x)$?

     What is $k'(x)$?

5.   a) $f'(x) =$ b) $h'(x) =$

    c) Let's say there's a function $k(x) = f(x) \cdot h(x)$ What is $k(x)$?

     What is $k'(x)$?

So, in general, if a function is made up of two other functions multiplied, can you find the derivative by just taking the derivative of each factor function and multiplying them?

For each function, use the "fake rule" (just taking the derivatives and multiplying them). Then simplify and take the derivative as normal.

ORIGINAL FUNCTION $h(x) = f(x) \cdot g(x)$	$f'(x) \cdot g'(x)$ [FAKE RULE]	SIMPLIFIED FUNCTION	Take its derivative [REAL ANSWER]
$y = (x)(x^2)$			
$y = (x^2)(1/x^2)$			
$y = (x)(x)$			
$y = (4x)(3x)$			

6. Write limit expressions for f(x), g(x), and h(x).   Why can't the "fake product rule" work?

7.   What rule **could** be used to find the derivative of a function that is composed of two functions multiplied?