3.1 The Chain Rule

Calculus   Name: _____

Find the derivative of each function.

1. $g(x) = e^{-5x} \cos 2x$

2. $h(x) = \ln(x^6 + 5)$

3. $f(x) = e^{\sin(x^2)}$

4. $y = \cos(\ln(2x^2))$

5. $g(x) = \sin^3(5x)$

Find $f'(0)$ given the following.

x	$g(x)$	$g'(x)$	$h(x)$	$h'(x)$
0	5	3	-2	-4
5	-2	4	6	-1

6. $f(x) = \left(\frac{h(x)}{g(x)}\right)^2$

7. $f(x) = h\big(g(x)\big)$

Find $f'(-1)$ given the following.

x	$g(x)$	$g'(x)$	$h(x)$	$h'(x)$
-1	2	-3	1	4
1	3	-6	-4	5

8. $f(x) = g\big(h(x)\big)$

9. $f(x) = \frac{[g(x)]^2}{h(x)}$

Find the slope of the tangent line at the given x-value. Show work.

10. $h(x) = \ln(e^{2x} + x)$ at $x = 0$.

11. $y = \sin^2\left(\frac{x}{2}\right)$ at $x = \frac{\pi}{3}$.

Find the equation of the tangent line at the given x-value.

12. $f(x) = (1 + \tan x)^{\frac{3}{2}}$ at $x = 0$.

13. $g(x) = \frac{1}{(3-2x)^2}$ at $x = 1$

Answers to 3.1 CA #2

1. $-\frac{5\cos(2x)+2\sin(2x)}{e^{5x}}$	2. $\frac{6x^5}{x^6+5}$	3. $2x\cos(x^2)e^{\sin(x^2)}$	4. $-\frac{2}{x}\sin(\ln(2x^2))$	5. $15\sin^2(5x)\cos(5x)$	6. $\frac{56}{125}$
7. -3	8. -24	9. -28	10. 3	11. $\frac{\sqrt{3}}{4}$	12. $y - 1 = \frac{3}{2}x$	13. $y - 1 = 4(x - 1)$