3.1 The Chain Rule

Calculus   Name: _____

Find the derivative of each function.

1. $h(x) = e^{\frac{5}{x}}$

2. $y = \left(\frac{x}{x-1}\right)^3$

3. $f(x) = \ln(x - 5x^5)$

4. $g(x) = \ln(3^{5x})$

5. $h(x) = \frac{1}{2}x - 2\sin^3(2x)$

6. $f(x) = e^{\sin(5x^9)}$

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

$g(1) = -1$ and $g'(1) = 2$
$h(1) = 4$ and $h'(1) = 5$

7. $f(x) = (g(x))^3$

8. $f(x) = \sqrt{h(x)}$

Find $f'(-2)$ given the following.

$g(-2) = -3$ and $g'(-2) = 5$
$h(-2) = 1$ and $h'(-2) = -4$

9. $f(x) = (g(x))^2 h(x)$

10. $f(x) = \frac{1}{\sqrt{h(x)}}$

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

11. $g(x) = (x^3 - 2)^5$ at $x = 1$.

12. $h(x) = \frac{\cos^2 x}{x}$ at $x = \frac{\pi}{6}$.

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

13. $y = \tan^2 x$ at $x = \frac{\pi}{4}$

14. $f(x) = e^{3x^4}$ at $x = 0$

Answers to 3.1 CA #1

1. $-\frac{5e^{\frac{5}{x}}}{x^2}$	2. $-\frac{3x^2}{(x-1)^4}$	3. $\frac{1-25x^4}{x-5x^5}$	4. $5\ln 3$	5. $\frac{1}{2} - 12\sin^2(2x)\cos(2x)$		
7. $66.\ 45x^8\cos(5x^9)\,e^{\sin(5x^9)}$		7. 6	8. $\frac{5}{4}$	9. -66		10. 2
11. 15		12. $-\frac{3\sqrt{3}}{\pi} - \frac{27}{\pi^2}$	13. $y - 1 = 4\left(x - \frac{\pi}{4}\right)$		14. $y = 1$	