Derivatives
Product Rule

Find the derivative of each of the following:

1. $y = (3x-2)^4$

2. $y = \sqrt{(2x-5)}$

3. $y = \dfrac{x^2 + 3x - 10}{x}$

4. $y = (5x-1)^6$

5. $y = (2x^2 + 4x - 3)(5x^3 + x + 2)$

6. $y = (3x^2 + 7)^3 (x^3 - x)$

7. $y = (-5x+4)^3 (x^3 - 2x^2)^2$

8. $y = x(x^4 - 2)^4$

9. $y = (4x^3 - x)^2 (2x^2 - 7x)^{-4}$

10. $y = (2x - 5)^4 (x^2 - 7)^5$

Answer the following

11. Find the equation of the tangent line to the function $f(x) = \dfrac{x^2 + x - 2}{2x}$ at the point where $x = 1$.

12. Find where $f(x) = (x^2 - 1)^3$ is increasing and decreasing and state the maxs/mins.

13. Suppose that the functions f and g and their first derivatives have the following values at $x = -1$ and $x = 0$. Find an expression for the derivative of the following combinations, then find the derivative at the indicated point.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
-1	0	-1	2	1
0	-1	-3	-2	4

a) $3f(x) - g(x)$ at $x = -1$

b) $f(x) \cdot 4g(x)$ at $x = 0$

c) $f(2x + g(x))$ at $x = -1$

14. For each of the following, use the fact that $g'(3) = 4$, $g(5) = -3$, $g'(5) = 6$, $h(5) = 3$, and $h'(5) = -2$ to find $f'(5)$.

a) $f(x) = g(x)h(x)$

b) $f(x) = g(h(x))$

c) $f(x) = [g(x)]^3$