

Product Rule Practice

For each of the following functions, identify one needs to use the product rule to find the derivative. If yes, then identify the two functions, $f(x)$ and $g(x)$.

	Function	Product Rule		$f(x)$	$g(x)$
		YES	NO		
1	$a(x) = 3e^{2x}$				
2	$b(x) = \cos x e^{2x}$				
3	$c(x) = 4 \sin x$				
4	$d(x) = 4x \sin x$				
5	$h(x) = \sin 4x$				
6	$j(x) = (4x - 3)(x^2 + 7x - 1)$				
7	$m(x) = 4(x - 1)$				
8	$p(x) = 4x\sqrt{x}$				

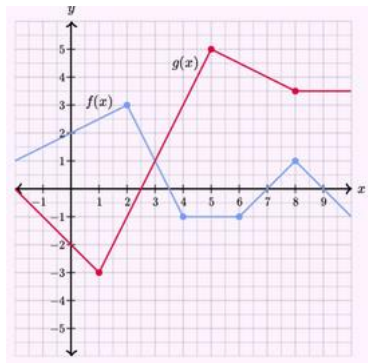
Product Rule Numerically

x	-1	0	3	4	8
$f(x)$	0	-3	1	-1	4
$f'(x)$	2	6	7	8	0
$g(x)$	5	1	-6	-1	-12
$g'(x)$	-2	3	5	$\frac{1}{2}$	10

Use the table above for problems #9 – 13.

- 9) Given $h(x) = 3xf(x)$, find $h'(0)$.
- 10) Given $r(x) = (4\sqrt{x} + 2)g(x)$, find $r'(4)$.
- 11) Given $v(x) = 2g(x)f(x)$, find $v'(3)$.
- 12) Given $w(x) = \left(\frac{1}{x} + 3x^2 - 1\right)g(x)$, find $w'(-1)$.
- 13) Write the equation of the line (in point-slope form) tangent to $w(x) = \sqrt[3]{x}g(x)$ at $x = 8$.

Product Rule Graphically



Use the graph above of the functions f and g for problems #14 – 18.

- 14) Given $h(x) = 4x^2 f(x)$. Find the slope of $h(x)$ at $x = 1$.
- 15) Given $y(x) = f(x)g(x)$. Find the slope of the tangent line to $y(x)$ at $x = 7$.
- 16) Find the instantaneous rate of change for $d(x)$ at $x = 9$, where $d(x) = \frac{2}{\sqrt{x}} g(x)$.
- 17) Write the equation of the line (in point-slope form) tangent to the curve $m(x) = (x^3 - 2)f(x)$ at $x = 3$.
- 18) Given $v(x) = g(x) \left(\frac{3}{2}x^4 + 4x - 1 \right)$, find $v'(2)$.

Product Rule Analytically (Algebraically)

- 19) Find the derivative of the function $f(x) = (x^3 - 2x + 1)(x - 3)$ using the product rule.
- 20) Find the derivative of the function $f(x) = (x^3 - 2x + 1)(x - 3)$ by distributing first. Verify that the answer is the same as #19.