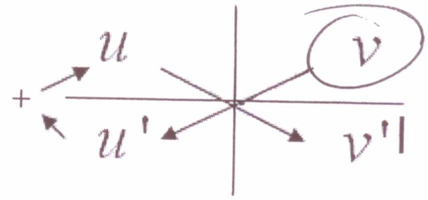
Product Rule

p. 193-198 (3.2) # 23



$$\frac{d}{dx}\left[uv\right] = vu' + uv'$$

$$= (\text{1st})(\text{deriv. of 2nd}) + (\text{2nd})(\text{deriv. of 1st})$$

Find the derivatives.

1. Find y' if $y = \left(2x^3 - 5x + 3\right)\left(-\left(x^2\right) - 2\right)$.

$y' = (2x^3 - 5x + 3)(-2x) + (-x^2 - 2)(6x^2 - 5)$

$= -4x^4 + 10x^2 - 6x - 6x^4 + 5x^2 - 12x^2 + 10 = -10x^4 + 3x^2 - 6x + 10$

2. Find the instantaneous rate of change for $f(x) = 3\sqrt{x}\left(2x^2 - 5x\right)$ at $x = 4$.

$f'(x) = (3\sqrt{x})(4x - 5) + (2x^2 - 5x)(3 \cdot \tfrac{1}{2}x^{-1/2})$

$f'(4) = 3(2)(11) + (32 - 20)\left(\frac{3}{2\sqrt{4}}\right)$

$= 66 + 9$

$= 75$

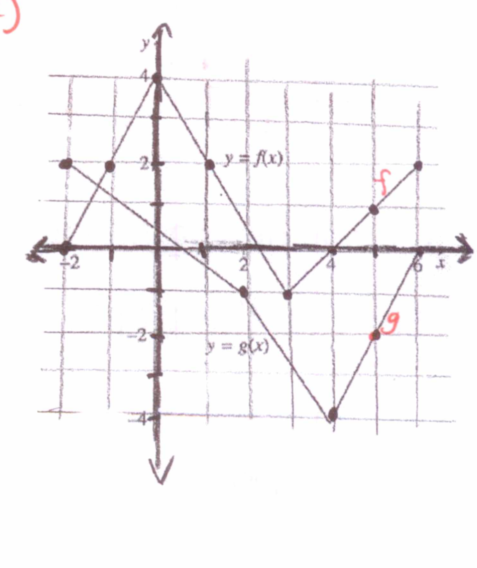
3. Considering $r(x)$ and $t(x)$ are differentiable functions, find the equation for the line tangent to $q(x)$ at $x = -3$, if $q(x) = r(x)t(x)$.

x	r(x)	t(x)	r'(x)	t'(x)
-3	-4	2	-2	3

$q' = r \cdot t' + t \cdot r' = (-4)(3) + (2)(-2)$

$= -12 - 4 = -16$

4. Considering $f(x)$ and $g(x)$ are the functions shown in the graph. Let $v(x) = f(x)\cdot g(x)$.



a) Find $v'(5)$.

$v' = f \cdot g' + g \cdot f'$

$= (1)(2) + (-2)(1)$

$= 0$

b) Find $v'(0)$.

~~$= (4)\left(-\frac{3}{4}\right) +$~~

DNE