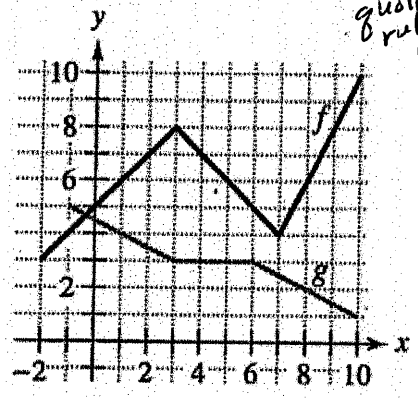
Ch. 2.3 **Product,Quotient Rule** HW Problems Evaluating Derivatives using graphs Key

Evaluating Derivatives **In Exercises 81 and 82, use the graphs of f and g. Let $p(x) = f(x)g(x)$ and $q(x) = f(x)/g(x)$.**

81. (a) Find $p'(1)$.

(b) Find $q'(4)$.



* product rule

a) $p'(x) = f'(x)\cdot g(x) + f(x)\cdot g'(x)$

$p'(1) = f'(1)\cdot g(1) + f(1)\cdot g'(1)$

$= (1)\cdot(4) + (6)\cdot(-\tfrac{1}{2}) = 4 - 3 = \boxed{1}$

quotient rule

b) $q'(x) = \dfrac{f'(x)\cdot g(x) - f(x)\cdot g'(x)}{g(x)^2}$

$q'(4) = \dfrac{f'(4)g(4) - f(4)g'(4)}{[g(4)]^2}$

$q'(4) = \dfrac{(-1)(3) - (7)(0)}{3^2}$

$q'(4) = \dfrac{-3}{3^2} = \boxed{-\dfrac{1}{3}}$

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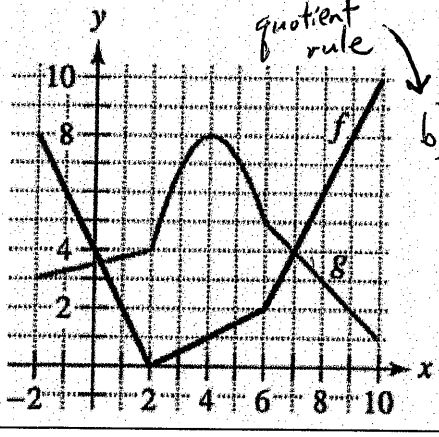
82. (a) Find $p'(4)$.

(b) Find $q'(7)$.



a) product Rule → $p'(x) = f'(x)\cdot g(x) + f(x)\cdot g'(x)$

$p'(4) = f'(4)\cdot g(4) + f(4)\cdot g'(4)$

$= (\tfrac{1}{2})\cdot(8) + (1)(0) = 4$

$\boxed{p'(4) = 4}$

quotient rule

b) $q'(x) = \dfrac{f'(x)g(x) - f(x)g'(x)}{g(x)^2}$

$q'(7) = \dfrac{f'(7)g(7) - f(7)g'(7)}{g(7)^2}$

$q'(7) = \dfrac{(2)(4) - 4(-1)}{4^2} = \dfrac{8+4}{16} = \dfrac{12}{16} = \dfrac{3}{4}$

$\boxed{q'(7) = 3/4}$

Using Relationships **In Exercises 103–106, use the given information to find $f'(2)$.**

$g(2) = 3$ and $g'(2) = -2$

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

103. $f(x) = 2g(x) + h(x)$

$f'(x) = 2g'(x) + h'(x)$

$f'(2) = 2g'(2) + h'(2)$

$= 2(-2) + 4 = 0$

$\boxed{f'(2) = 0}$

Apply quotient rule

105. $f(x) = \dfrac{g(x)}{h(x)}$

$f'(x) = \dfrac{g'(x)h(x) - g(x)h'(x)}{h(x)^2}$

$f'(2) = \dfrac{g'(2)h(2) - g(2)h'(2)}{h(2)^2}$

$f'(2) = \dfrac{(-2)(-1) - 3(4)}{(-1)^2}$

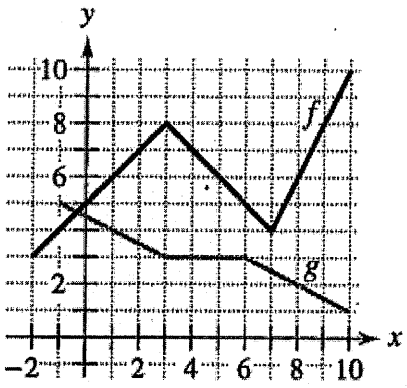
$f'(2) = \dfrac{2 - 12}{1} = -10$

$\boxed{f'(2) = -10}$

Evaluating Derivatives **In Exercises 81 and 82, use the graphs of f and g. Let $p(x) = f(x)g(x)$ and $q(x) = f(x)/g(x)$.**

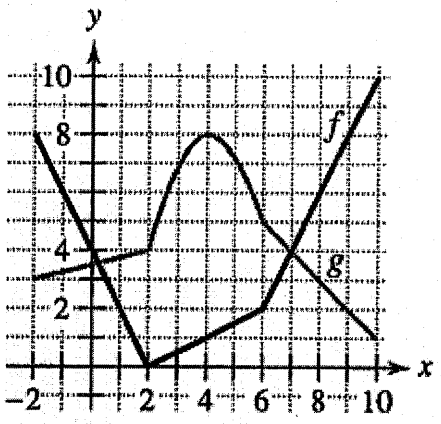
81. (a) Find $p'(1)$.

(b) Find $q'(4)$.



82. (a) Find $p'(4)$.

(b) Find $q'(7)$.



Using Relationships **In Exercises 103–106, use the given information to find $f'(2)$.**

$g(2) = 3$ **and** $g'(2) = -2$

$h(2) = -1$ **and** $h'(2) = 4$

103. $f(x) = 2g(x) + h(x)$

105. $f(x) = \dfrac{g(x)}{h(x)}$