Kuta Software - Infinite Calculus

Name KEY

Differentiation Rules, with Tables

Date________________ Period____

For each problem, you are given a table containing some values of differentiable functions $f(x)$, $g(x)$ and their derivatives. Use the table data and the rules of differentiation to solve each problem.

1)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	2	1	1	2
2	3	0	3	0
3	2	−1	1	−2

Given $h(x) = f(x) + g(x)$, find $h'(1)$

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

$h'(1) = f'(1) + g'(1)$

$= 1 + 2$

$= \boxed{3}$

2)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	2	−1	1	1
2	1	$\frac{1}{2}$	2	1
3	3	2	3	1

Given $h(x) = f(x) - g(x)$, find $h'(2)$

$h'(x) = f'(x) - g'(x)$

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

$= \frac{1}{2} - 1$

$= \boxed{\frac{-1}{2}}$

3)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	2	−1	1	2
2	1	$\frac{1}{2}$	3	0
3	3	2	1	−2

Given $h(x) = f(x) \cdot g(x)$, find $h'(3)$ Product Rule

$h'(x) = f'(x) \cdot g(x) + f(x) \cdot g'(x)$

$= (2)(1) + (3)(-2)$

$= 2 - 6$

$= \boxed{-4}$

4)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	3	−1	2	−1
2	2	−1	1	0
3	1	−1	2	1

Given $h(x) = \frac{f(x)}{g(x)}$, find $h'(3)$ Quotient Rule

$$h'(x) = \frac{f'(x)\,g(x) - [f(x) \cdot g'(x)]}{[g(x)]^2}$$

$$= \frac{(-1)(2) - [(1)(1)]}{2^2}$$

$$= \frac{-2-1}{4} = \boxed{-3/4}$$

5)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	5	−1	1	2
2	4	−1	3	$\frac{3}{2}$
3	3	−1	4	1
4	2	−1	5	1
5	1	0	6	$-\frac{1}{2}$
6	2	1	4	−2

Part 1) Given $h_1(x) = f(x) + g(x)$, find $h_1'(2)$

Part 2) Given $h_2(x) = f(x) - g(x)$, find $h_2'(3)$

Part 3) Given $h_3(x) = f(x) \cdot g(x)$, find $h_3'(4)$

Part 4) Given $h_4(x) = \dfrac{f(x)}{g(x)}$, find $h_4'(2)$

Part 5) Given $h_5(x) = (f(x))^2$, find $h_5'(2)$

Part 6) Given $h_6(x) = f(g(x))$, find $h_6'(6)$

} Chain Rule

1 $h_1'(2) = f'(2) + g'(2) = (-1) + \frac{3}{2} = \boxed{\frac{1}{2}}$

2 $h'(3) = f'(3) - g'(3) = (-1) - 1 = \boxed{-2}$

3 $h'(4) = f'(4)\, g(4) + f(4)\, g'(4) = (-1)(5) + (2)(1) = -5 + 2 = \boxed{-3}$

4 $h'(2) = \dfrac{f'(2)\, g(2) - f(2)\, g'(2)}{[g(2)]^2} = \dfrac{(-1)(3) - [(4)(\frac{3}{2})]}{3^2}$

$= \dfrac{-3-6}{9} = \dfrac{-9}{9} = \boxed{-1}$

5 $h'(x) = 2 \cdot f(x)^{2-1} \cdot f'(x) = 2 f(2) \cdot f'(2) = (2)(4)(-1) = \boxed{-8}$

6 $h'(x) = f'(g(x)) \cdot g'(x) = f'(g(6)) \cdot g'(6)$

$= f'(4) \cdot g'(6) = (-1)(-2) = \boxed{2}$