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More on rules of derivatives

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$\frac{gf' - fg'}{g^2}$

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1. If $f(5)=1$, $f'(5)=6$, $g(5)=-3$, $g'(5)=2$. Find the values of

a) $(f\cdot g)'(5) = fg' + gf' = 2-18 = -16$

b) $(f/g)'(5) = \frac{-18-2}{9} = \frac{-20}{9}$

c) $(g/f)'(5) = \frac{2+18}{1} = 20$

$fg' + gf'$

2. If $f(3)=4$, $g(3)=2$, $f'(3)=-6$ and $g'(3)=5$, find the following values

a) $(f+g)'(3) = f'(3) + g'(3) = -1$

b) $(f\cdot g)'(3) = 20 - 12 = 8$

c) $(f/g)'(3) = \frac{-12-20}{4} = \frac{-32}{4} = -8$

3. If $h(x)=f(x)g(x)$, use the table to find $h'(-1)$, $h'(0)$ and $h'(1)$

$h'(-1) = f(-1)g'(-1) + g(-1)f'(-1)$
$= (2)(2) + (1)(1)$

$h'(-1) = 8$
$h'(0) = -3$
$h'(1) = 10$

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-1	2	1	1	2
0	-1	0	-1	3
1	2	-1	0	5

$\frac{uv' - vu'}{v^2}$ $\frac{vu' - uv'}{u^2}$

4. If $h(x)=f(x)/g(x)$, use the table to find $h'(-1)$, $h'(0)$ and $h'(1)$

$h'(-1) = \frac{f(-1)g(-1)' - g(-1)f(-1)'}{f^2}$

$h'(-1) = -3$ $h'(1) = \frac{12}{4}$

$h'(0) = +3$
$h'(1) = -3$

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-1	2	1	1	2
0	-1	0	-1	3
1	2	-1	2	5

5. Considering that $P(x) = F(x)G(x)$ y $Q(x) = F(x)/G(x)$, where F and G are functions whose graphs are shown below.

a) Find $P'(2) = \frac{3}{2}$ b) Find $Q'(7) = \frac{-43}{12}$

$F(2) = 3$ $G(2) = 2$
$F'(2) = 0$ $G'(2) = \frac{1}{2}$

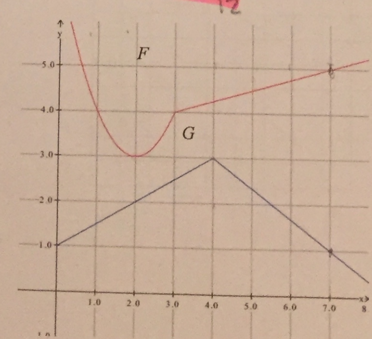
$F(7) = 5$ $G(7) = 1$
$F'(7) = \frac{1}{4}$ $G'(7) = -\frac{2}{3}$

$P'(2) = F\cdot G' + GF'$
$= 3\cdot\frac{1}{2}$
$P'(2) = \frac{3}{2}$

$Q'(7) = \frac{FG' - GF'}{G^2}$

$Q'(7) = \frac{-\frac{10}{3} - \frac{1}{4}}{25}$

$Q'(7) = \frac{-43}{12} = \frac{+43}{12}$



6. Consider that $h(x)=f(g(x))$, find $h'(-1)$, $h'(0)$ and $h'(1)$

$h(x)=f(g(x))$
$h'(x)=f'(g(x))\,g'(x)$

$h'(0)=f'(-1)g'(0)$
$h'(1)=f'(0)g'(1)$

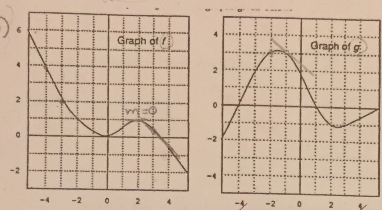
$h'(-1)=-2$
$h'(0)=3$
$h'(1)=0$

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-1	2	1	1	2
0	-1	0	-1	3
1	2	-1	0	5

$h'(-1)=f'(g(-1))g'(-1)$
$=f'(1)\,g'(-1)$
$=(-1)(2)$

7. Consider that $h(x)=f(g(x))$, where f and g are functions whose graphs are shown below.

$h(-2)=f(g(-2))$
$h(-2)=f(3)$
$h(-2)=0.5$
$h(3)=f(g(3))$
$h(3)=f(-1)$
$h(3)\approx 0.25$



b) $h'(-3)=f'(g(-3))\,g'(-3)$
$=f'(2)g'(-3)$
$h'(3)=0$

$h'(-1)=f'(g(-1))\,g'(-1)$
$=f'(3)g'(-1)$
$=(-)\ (-)$

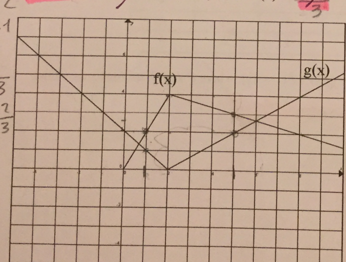
a) Evaluate $h(-2)$ and $h(3)$ $h(-2)=0.5$, $h(3)\approx 0.25$
b) Is $h'(-3)$ positive, negative or zero? Explain your answer. = zero, because is a curve
c) Is $h'(-1)$ positive, negative or zero? Explain your answer. = Positive, because both slopes were negative

$y'=uv'+vu'$ $\quad y'=\frac{vu'-uv'}{v^2}$

8. If $f(x)$ and $g(x)$ are the functions whose graphs are shown, let $u(x)=f(x)\cdot g(x)$ and $v(t)=f(x)/g(x)$

a) Find $u'(1)=0$ b) Find $v'(5)=-\frac{2}{3}$

$f(1)=2$ $f'(1)=2$
$g(1)=1$ $g'(1)=-1$
$f(5)=3$ $f'(5)=\frac{-1}{3}$
$g(5)=2$ $g'(5)=\frac{2}{3}$



$u'(1)=(2)(-1)+(1)(2)$
$u'(1)=0$

$v'(5)=\dfrac{(2)\left(\frac{-1}{3}\right)-\left(\frac{2}{3}\right)(3)}{4}$

$=\dfrac{-\frac{2}{3}-2}{4}$

$v'(5)=\dfrac{-\frac{8}{3}}{4}$

$v(5)=\frac{-2}{3}$