Chain Rule Practice
Doing derivatives with tables

X	f(x)	g(x)	f'(x)	g'(x)
3	1	8	-3	-5
6	3	-2	4	5
8	-1	3	π	4
1	2	-6	5	0

Find the derivative for each at x = 3

1. $f(x)g(x)$

$f(k)g'(k) + g(k)f'(k)$

$1 \cdot -5 + 8 \cdot -3$

$\boxed{-29}$

2. $\dfrac{f(x)}{g(x)}$

$\dfrac{g f' - f g'}{g^2}$

$[8 \cdot -3 - 1 \cdot -5]/64$

$\dfrac{-19}{64}$

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

$= \dfrac{1 \cdot -5 - 8 \cdot -3}{1}$

$= 19$

4. $(f(x))^2$

$2 f(k) f'(k)$

$2 \cdot 1 \cdot -3$

-6

5. $\sqrt{f(x)}$

$\dfrac{f'}{2\sqrt{f}}$ $\quad \dfrac{-3}{2\sqrt{1}} = \dfrac{-3}{2}$

6. $\sqrt{f(x) + g(x)}$

$\dfrac{f' + g'}{2\sqrt{f+g}} = \dfrac{-8}{2\sqrt{9}} = \dfrac{-4}{3}$

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Find the derivative of each at x = 3

7. $\frac{1}{\sqrt[3]{g(x)}} = [g(x)]^{-\frac{1}{3}}$

$-\frac{1}{3}[g(x)]^{-\frac{4}{3}}(g'(x))$

$-\frac{1}{3}[g(3)]^{-\frac{4}{3}}(g'(3))$

$-\frac{1}{3}(2^8)^{-\frac{4}{8}}(-5) = \frac{5}{248}$

8. $\frac{f(x)}{f(x)+g(x)}$

$\frac{[f(x)+g(x)]f'(x) - f(x)[f'+g']}{[f(x)+g(x)]^2}$

$\frac{9\cdot(-3) - 1(-8)}{81} = \frac{-27+8}{81}$

$-\frac{19}{81}$

9. g(g(x))

$g'(g(x))\,g'(x)$

$g'(8)\cdot(-5)$

$4\cdot(-5)$

-20

10. $x^4\sqrt{f(x)}$

$x^4 \frac{1}{2\sqrt{f(x)}} f'(x) + \sqrt{f(x)}\,4x^3$

$\frac{81}{2}\frac{(-3)}{1} + 1\cdot 4\cdot 27$

$\frac{-243}{2} + \frac{108}{1} = \frac{-27}{2}$

11. f(2x)

$f'(2x)(2)$

$f'(6)(2)$

$4\cdot 2$

8

12. $[g(3x-1)]^3$

$3[g(3x-1)]^2 g'(3x-1)(3)$

$3[g(8)]^2 g'(8)(3)$

$3(3)^2\,4\cdot 3 = 81\cdot 4$

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