5. $y = \sqrt{\underbrace{5x-2}_{u}}$

$u = 5x - 2$ $\qquad f(u) = \sqrt{u} = u^{1/2}$

$\frac{du}{dx} = 5$ $\qquad \frac{dy}{du} = \frac{1}{2}u^{-1/2}$

$$\frac{dy}{dx} = \frac{dy}{du}\frac{du}{dx} = 5\left(\frac{1}{2}u^{-1/2}\right)$$

$$= \frac{5}{2}(5x-2)^{-1/2}$$

$$= \frac{5}{2\sqrt{5x-2}}$$

2.5 Review The Chain Rule

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

$$h'(x) = \frac{dy}{du}\frac{du}{dx} \qquad u = g(x)$$

1) $y = \underbrace{(6x-5)}_{u}^{4}$ $\qquad u = 6x-5$ $\qquad y = f(u) = u^4$

$\frac{du}{dx} = 6$ $\qquad \frac{dy}{du} = 4u^3$

$y' = 4u^3(6)$

$= 4(6x-5)^3(6)$

$= 24(6x-5)^3$

$y'' = 24(3)(6x-5)^2(6)$

$y^{(5)}$

23. $y = (\underbrace{2x-7}_{u})^3$

$y' = 3(2x-7)^2(2)$

$= 6(2x-7)^2$

65. $y = \left(\frac{6-5x}{x^2-1}\right)^2$ $\quad u = \frac{6-5x}{x^2-1}$ $\quad f(u) = u^2$ chain rule set up

$\frac{dy}{du} = 2u$

$\frac{du}{dx} = \frac{(x^2-1)(-5) - (6-5x)(2x)}{(x^2-1)^2}$ quotient rule

$= \frac{-5x^2+5-12x+10x^2}{(x^2-1)^2} = \frac{5x^2-12x+5}{(x^2-1)^2}$

$y' = 2u\left(\frac{5x^2-12x+5}{(x^2-1)^2}\right) = 2\left(\frac{6-5x}{x^2-1}\right)\left(\frac{5x^2-12x+5}{(x^2-1)^2}\right)$ used chain rule

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$y = \sqrt[3]{9x^2+4}$

$u = 9x^2+4$ $\quad f(u) = \sqrt[3]{u} = u^{1/3}$

$\frac{du}{dx} = 18x$ $\quad \frac{dy}{du} = \frac{1}{3}u^{-2/3}$

$y' = 18x\left(\frac{1}{3}u^{-2/3}\right)$

$= 18\left[\frac{1}{3}(9x^2+4)^{-2/3}\right]$

$= \frac{6}{(9x^2+4)^{2/3}}$