Differentiate the function.

$$y = (18 - x)^{67} \Rightarrow y' = 67(18-x)^{66}(-1)$$

$$= -67(18-x)^{66}$$

Differentiate the function.

$$y = \sqrt{x^2 + 9} \Rightarrow \frac{dy}{dx} = \frac{1}{2}(x^2+9)^{-\frac{1}{2}}(2x)$$

$y = (x^2+9)^{\frac{1}{2}}$

$$= x(x^2+9)^{-\frac{1}{2}}$$

$$= \frac{x}{\sqrt{x^2+9}}$$

Differentiate the function.

$$y = \frac{1}{(7x - 20)^4} \Rightarrow y' = -4(7x-20)^{-5}(7)$$

$$= \frac{-28}{(7x-20)^5}$$

$y = (7x-20)^{-4}$

Differentiate the function.

$$y = \underbrace{(2x-1)^5}_{f(x)}\underbrace{(4-x^3)^5}_{g(x)} \Rightarrow y' = f(x)g'(x) + g(x)f'(x)$$

$$y' = (2x-1)^5\left[5(4-x^3)^4(-3x^2)\right] + (4-x^3)^5\left[5(2x-1)^4(2)\right]$$

$$= -15x^2(2x-1)^5(4-x^3)^4 + 10(4-x^3)^5(2x-1)^4$$

GCF: $-5(2x-1)^4(4-x^3)^4$

$$= -5(2x-1)^4(4-x^3)^4\left[3x^2(2x-1) - 2(4-x^3)\right]$$

$$= -5(2x-1)^4(4-x^3)^4\left[6x^3 - 3x^2 - 8 + 2x^3\right]$$

$$= \boxed{-5(2x-1)^4(4-x^3)^4(8x^3 - 3x^2 - 8)}$$

Differentiate the given function.

$y = x^2\sqrt{2x-5} = \underbrace{x^2}_{f(x)} \cdot \underbrace{(2x-5)^{\frac{1}{2}}}_{g(x)}$

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

$= x^2\left[\frac{1}{2}(2x-5)^{-\frac{1}{2}}(2)\right] + (2x-5)^{\frac{1}{2}}(2x)$

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

GCF: $x(2x-5)^{-\frac{1}{2}}$

$= x(2x-5)^{-\frac{1}{2}}\left[x + 2(2x-5)\right]$

$= x(2x-5)^{-\frac{1}{2}}(x + 4x - 10)$

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

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

Differentiate the function.

$$f(x) = \left(\frac{x-2}{x-6}\right)^5$$

$$f'(x) = 5\left(\frac{x-2}{x-6}\right)^4 \cdot \frac{d}{dx}\left(\frac{x-2}{x-6}\right)$$

($N(x)$: $x-2$; $D(x)$: $x-6$)

$$\frac{D(x)N'(x) - N(x)D'(x)}{[D(x)]^2}$$

$$= 5\left(\frac{x-2}{x-6}\right)^4 \cdot \frac{(x-6)(1) - (x-2)(1)}{(x-6)^2}$$

$$= 5\left(\frac{x-2}{x-6}\right)^4 \cdot \frac{x-6-x+2}{(x-6)^2}$$

$$= 5\left(\frac{x-2}{x-6}\right)^4 \cdot \frac{-4}{(x-6)^2}$$

$$= \frac{-20(x-2)^4}{(x-6)^4} \cdot \frac{1}{(x-6)^2} = \frac{-20(x-2)^4}{(x-6)^6}$$

Differentiate the function.

$$y = \frac{(2x+1)^4}{(4x+3)^2} = \frac{f(x)}{g(x)} \Rightarrow$$

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

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

$$= \frac{8(4x+3)^2(2x+1)^3 - 8(2x+1)^4(4x+3)}{(4x+3)^4}$$

$$= \frac{8(4x+3)(2x+1)^3\left[(4x+3) - (2x+1)\right]}{(4x+3)^4}$$

$$= \frac{8(2x+1)^3(4x+3-2x-1)}{(4x+3)^3}$$

$$= \frac{8(2x+1)^3(2x+2)}{(4x+3)^3} \quad 2(x+1)$$

$$= \frac{16(2x+1)^3(x+1)}{(4x+3)^3}$$