

Quotient rule quiz

Sunday, November 03, 2013
6:02 AM

Differentiate the following:

$$\textcircled{1} \quad y = \frac{5x}{6x+2}$$

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

$$\textcircled{3} \quad y = \frac{\sqrt{x+1}}{x}$$

Answers:

$$\textcircled{1} \quad u = 5x \quad v = 6x+2$$

$$u' = 5 \quad v' = 6$$

$$y' = \frac{v u' - u v'}{v^2} = \frac{(6x+2) \times 5 - 5x \times 6}{(6x+2)^2}$$
$$= \frac{5(6x+2) - 30x}{(6x+2)^2}$$

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

$$u = (2x+1)^3$$

$$v = (4x-1)^2$$

$$u' = 3(2x+1)^2 \times 2$$

$$v' = 2(4x-1) \times 4$$

$$= 6(2x+1)^2$$

$$= 8(4x-1)$$

$$y' = \frac{v u' - u v'}{v^2} = \frac{(4x-1)^2 \times 6(2x+1)^2 - (2x+1)^3 \times 8(4x-1)}{(4x-1)^4}$$
$$= \frac{6(4x-1)^2(2x+1)^2 - 8(2x+1)^3(4x-1)}{(4x-1)^4}$$

$$\textcircled{3} \quad y = \frac{\sqrt{x+1}}{x}$$

$$u = \sqrt{x+1} = (x+1)^{\frac{1}{2}} \quad v = x$$

$$u' = \frac{1}{2}(x+1)^{-\frac{1}{2}} \quad v' = 1$$

$$\begin{aligned} \frac{dy}{dx} &= \frac{v u' - u v'}{v^2} = \frac{x \times \frac{1}{2}(x+1)^{-\frac{1}{2}} - (x+1)^{\frac{1}{2}} \times 1}{x^2} \\ &= \frac{0.5x(x+1)^{-0.5} - \sqrt{x+1}}{x^2} \end{aligned}$$