Use logarithmic differentiation to find the derivative of y with respect to x.

$$y = \frac{x\sqrt{x^2+9}}{(x+2)^{5/3}}$$

Find y'. Choose the correct derivative.

A. $\dfrac{x\sqrt{x^2+9}}{(x+2)^{5/3}}\left(\dfrac{1}{x}+\dfrac{x}{\sqrt{x^2+9}}-\dfrac{5}{3(x+2)^{2/3}}\right)$

B. $\left(\dfrac{1}{x}+\dfrac{x}{x^2+9}-\dfrac{5}{3(x+2)}\right)$

C. $\dfrac{x\sqrt{x^2+9}}{(x+2)^{5/3}}\left(\dfrac{1}{x}+\dfrac{x}{x^2+9}-\dfrac{5}{3(x+2)}\right)$

D. $\dfrac{1}{x}+\dfrac{x}{\sqrt{x^2+9}}-\dfrac{5}{3(x+2)^{2/3}}$

Take log of both sides then rewrite

$$\ln y = \ln \frac{x\,(x^2+9)^{1/2}}{(x+2)^{5/3}} \iff$$

$$\ln(y) = \ln x + \frac{1}{2}\ln(x^2+9) - \frac{5}{3}\ln(x+2)$$

$$\frac{y'}{y} = \frac{1}{x} + \frac{1}{2}\cdot\frac{2x}{x^2+9} - \frac{5}{3}\cdot\frac{1}{x+2}$$

$$\frac{y'}{y} = \frac{1}{x} + \frac{x}{x^2+9} - \frac{5}{3x+6}$$

$$y' = y\left(\frac{1}{x} + \frac{x}{x^2+9} - \frac{5}{3x+6}\right)$$

$$= \frac{x\sqrt{x^2+9}}{(x+2)^{5/3}}\left(\frac{1}{x} + \frac{x}{x^2+9} - \frac{5}{3x+6}\right)$$

Find the derivative of y with respect to x for $y = (9x+4)^x$.

$$\ln y = \ln (9x+4)^x$$

$$\ln(y) = x \cdot \ln (9x+4)$$

$$\frac{y'}{y} = x \cdot \frac{9}{9x+4} + \ln(9x+4) \cdot 1$$

$$\frac{y'}{y} = \frac{9x}{9x+4} + \ln(9x+4)$$

$$y' = y\left(\frac{9x}{9x+4} + \ln(9x+4)\right)$$

$$= \left((9x+4)^x\left[\frac{9x}{9x+4} + \ln(9x+4)\right]\right)$$