$$f(x) = \frac{x^{\frac{3}{4}}\sqrt{x^2+1}}{(3x+2)^5} \qquad g(x) = \ln \frac{x^{\frac{3}{4}}\sqrt{x^2+1}}{(3x+2)^5}$$

$$g'(x) = \frac{(3x+2)^5}{x^{\frac{3}{4}}\sqrt{x^2+1}} \cdot \frac{d}{dx} f(x)$$

$$g(x) = \frac{3}{4}\ln x + \frac{1}{2}\ln(x^2+1) - 5\ln(3x+2)$$

$$g'(x) = \frac{3}{4x} + \frac{1}{2(x^2+1)} \cdot 2x - 5 \cdot \frac{1}{3x+2} \cdot 3$$

$$= \frac{3}{4x} + \frac{2x}{2(x^2+1)} - \frac{15}{3x+2}$$

$$\Rightarrow \quad f'(x) = \frac{x^{\frac{3}{4}}\sqrt{x^2+1}}{(3x+2)^5} \cdot \left[\frac{3}{4x} + \frac{2x}{2(x^2+1)} - \frac{15}{3x+2}\right]$$