9. $y = \sqrt{x^3(x+5)(x+7)} \qquad x>0$

$$\ln y = \ln\left[x^3(x+5)(x+7)\right]^{\frac{1}{2}}$$

$$\ln y = \tfrac{1}{2}\ln\left[x^3(x+5)(x+7)\right]$$

$$\ln y = \tfrac{1}{2}\ln x^3 + \tfrac{1}{2}\ln(x+5) + \tfrac{1}{2}\ln(x+7)$$

$$\ln y = \tfrac{3}{2}\ln x + \tfrac{1}{2}\ln(x+5) + \tfrac{1}{2}\ln(x+7)$$

$$\frac{d}{dx}(\ln y) = \frac{d}{dx}\left(\tfrac{3}{2}\ln x\right) + \frac{d}{dx}\left(\tfrac{1}{2}\ln(x+5)\right) + \frac{d}{dx}\left(\tfrac{1}{2}\ln(x+7)\right)$$

$$\frac{1}{y}\cdot y' = \frac{3}{2}\cdot\frac{1}{x} + \frac{1}{2}\cdot\frac{1}{x+5}\cdot\frac{d}{dx}(x+5) + \frac{1}{2}\cdot\frac{1}{x+7}\cdot\frac{d}{dx}(x+7)$$

$$\frac{1}{y}\cdot y' = \frac{3}{2x} + \frac{1}{2(x+5)} + \frac{1}{2(x+7)}$$

$$y\cdot\left[\frac{1}{y}y'\right] = y\left[\frac{3}{2x} + \frac{1}{2(x+5)} + \frac{1}{2(x+7)}\right]$$

$$y' = \sqrt{x^3(x+5)(x+7)}\left[\frac{3(x+5)(x+7)}{2x(x+5)(x+7)} + \frac{1x(x+7)}{2x(x+5)(x+7)} + \frac{1x(x+5)}{2x(x+5)(x+7)}\right]$$

$$y' = \sqrt{x^3(x+5)(x+7)}\left[\frac{3(x+5)(x+7) + x(x+7) + x(x+5)}{2x(x+5)(x+7)}\right]$$

$$y' = x\sqrt{x(x+5)(x+7)}\left[\frac{3(x^2+12x+35) + x^2+7x+x^2+5x}{2x(x+5)(x+7)}\right]$$

$$y' = \frac{x\sqrt{x(x+5)(x+7)}\left[3x^2+36x+105+2x^2+12x\right]}{2x(x+5)(x+7)}$$

$$y' = \frac{\sqrt{x(x+5)(x+7)}\left[5x^2+48x+105\right]}{2(x+5)(x+7)}$$