

Sec. 4.2 Derivatives of Products and Quotients

$$1. f'(x) = x^3 e^x + 3x^2 e^x$$

$$3. f'(x) = \frac{\sqrt{x}}{x} + \frac{1}{2} x^{-1/2} \ln x$$

$$5. f'(x) = e^x (2x) + (x^2 - 3) e^x$$

$$7. f'(x) = (4e^x - x^5) \left(\frac{1}{x}\right) - (4e^x - 5x^4) (\ln x)$$

$$9. f'(x) = (e^x + 1) \left(\frac{1}{2} x^{-1/2}\right) + (\sqrt{x} + 1) (e^x)$$

$$11. f'(x) = (2x - 3 \ln x) (1 - x^{-2}) + \left(2 - \frac{3}{x}\right) \left(x + \frac{1}{x}\right)$$

$$13. f(x) = \frac{\ln x}{e^x}$$

$$f'(x) = \frac{e^x (1/x) - e^x \ln x}{e^{2x}}$$

$$15. f'(x) = \frac{\ln(x)(0) - 1(1/x)}{(\ln x)^2}$$

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

$$17. f'(x) = \frac{(x+2)(1) - (x)(1)}{(x+2)^2}$$

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

$$19. f'(x) = \frac{(x+5)(1) - (x-3)(1)}{(x+5)^2}$$

$$f'(x) = \frac{8}{(x+5)^2}$$

$$21. f'(x) = \frac{(x-2)e^x - (1)e^x}{(x-2)^2}$$

$$f'(x) = \frac{e^x (x-3)}{(x-2)^2}$$

$$23. f'(x) = \frac{(2x-1)(-3) - (2-3x)(2)}{(2x-1)^2}$$

$$f'(x) = \frac{-1}{(2x-1)^2}$$

$$25. \frac{dy}{du} = \frac{(u^2+1)3e^u - 3e^u(2u)}{(u^2+1)^2}$$

$$\frac{dy}{du} = \frac{3e^u(u^2-2u+1)}{(u^2+1)^2}$$

$$27. \frac{dy}{du} = \frac{(u^2+2)(1) - (u+1)(2u)}{(u^2+2)^2}$$

$$= \frac{-u^2-2u+2}{(u^2+2)^2}$$

$$29. \frac{dy}{du} = \frac{(u^2+3)(3u^2) - (u^3-1)(2u)}{(u^2+3)^2}$$

$$= \frac{u^4+9u^2+2u}{(u^2+3)^2}$$

$$31. \frac{dy}{du} = \frac{(u^3-e^u-1) \left(\frac{1}{3}u^{-2/3}\right) - (u^{1/3})(3u^2-e^u)}{(u^3-e^u-1)^2}$$

$$33. R'(x) = \frac{(1+x^2)(1) - (x)(2x)}{(1+x^2)^2}$$

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

$$51. f'(x) = x(\cos x) + \sin x (1)$$

$$= x \cos x + \sin x$$