

section 3.3 pg 132 # 1, 3, 7, 9, 11, 13, 17, 21, 25, 29

$$\textcircled{1} \quad y = (3x+4)^5$$

$$\frac{dy}{dx} = 5(3x+4)^4 (3) = 15(3x+4)^4$$

$$\textcircled{3} \quad y = \frac{1}{3x-2} \quad (\text{think of } (3x-2)^{-1} \text{ and use chain rule})$$

$$\frac{dy}{dx} = \frac{-1}{(3x-2)^2} \cdot 3 = \frac{-3}{(3x-2)^2}$$

$$\textcircled{7} \quad y = (2-x)^4 (3+x)^7$$

$$\frac{dy}{dx} = 4(2-x)^3(-1)(3+x)^7 + 7(3+x)^6(2-x)^4$$

$$= -4(2-x)^3(3+x)^7 + 7(3+x)^6(2-x)^4$$

$$= (2-x)^3(3+x)^6 [-4(3+x) + 7(2-x)]$$

$$= (2-x)^3(3+x)^6 (-11x+2)$$

$$\textcircled{9} \quad y = \frac{x+2}{(3x-4)^3}$$

$$\frac{dy}{dx} = \frac{(3x-4)^3 + (x+2)(3)(3x-4)^2(3)}{(3x-4)^6} = \frac{(3x-4)^2 [3x-4 + 9x+18]}{(3x-4)^6}$$

$$= \frac{12x+16}{(3x-4)^4}$$

$$\textcircled{11} \quad y = [1 + (1+x)^3]^4$$

$$\frac{dy}{dx} = 4 [1 + (1+x)^3]^3 (1+x)^2 (3) = 12(1+x)^2 [1 + (1+x)^3]^3$$

$$\textcircled{13} \quad y = (u+1)^3 \quad u = \frac{1}{x^2}$$

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx} = 3(u+1)^2 (-2) \frac{1}{x^3} = -6 \left(\frac{1}{x^2} + 1 \right)^2 \frac{1}{x^3}$$

$$\textcircled{17} \quad y = \frac{u}{u+1} \quad u = \frac{x}{x+1}$$

$$\begin{aligned} \frac{dy}{dx} &= \frac{dy}{du} \cdot \frac{du}{dx} = \frac{u+1-(u)}{(u+1)^2} \cdot \frac{x+1-x}{(x+1)^2} = \frac{1}{(u+1)^2} \cdot \frac{1}{(x+1)^2} \\ &= \frac{1}{\left(\frac{x}{x+1} + 1\right)^2} \cdot \frac{1}{(x+1)^2} = \frac{1}{\left(\frac{x+x+1}{x+1}\right)^2} \cdot \frac{1}{(x+1)^2} = \frac{(x+1)^2}{(2x+1)^2} \cdot \frac{1}{(x+1)^2} = \frac{1}{(2x+1)^2} \end{aligned}$$

$$\textcircled{21} \quad f(x) = (2x - x^2)^3 \quad u = 2x - x^2 \quad n = 3$$

$$f(x) = u^3 \quad f'(x) = 3u^2 \cdot u' = 3(2x - x^2)^2 (2 - 2x)$$

$$\textcircled{25} \quad f(x) = \left(\frac{x+1}{x-1}\right)^7 \quad u = \frac{x+1}{x-1} \quad n = 7$$

$$f(x) = u^7 \quad f'(x) = 7u^6 \cdot u' = 7\left(\frac{x+1}{x-1}\right)^6 \left[\frac{x-1-(x+1)}{(x-1)^2}\right] = 7\left(\frac{x+1}{x-1}\right)^6 \left(\frac{-2}{(x-1)^2}\right)$$

$$\textcircled{29} \quad F(s) = \left(s - \frac{1}{s^2}\right)^3$$

$$F'(s) = 3\left(s - \frac{1}{s^2}\right)^2 \left(1 + \frac{2}{s^3}\right)$$