

Ex 2.7.14

$$(u^n)' = n \cdot u^{n-1} \cdot u'$$

$$a) f'(x) = 4 \cdot (2x+3)^3 \cdot 2 = 8(2x+3)^3$$

$$b) f'(x) = 5(3-x)^4 \cdot (-1) = -5(3-x)^4$$

$$c) f'(x) = 3(x^2+5x+1)^2 \cdot (2x+5) = 3(2x+5)(x^2+5x+1)$$

$$d) f'(x) = 7(x^3-2x)^6 \cdot (3x^2-2) = 7(3x^2-2)(x^3-2x)$$

$$e) u = x^2 \quad ; \quad u' = 2x$$

$$v = (5x+2)^3 \quad ; \quad v' = 3(5x+2)^2 \cdot 5 = 15(5x+2)^2$$

$$\begin{aligned} f'(x) &= 2x(5x+2)^3 + x^2 \cdot 15(5x+2)^2 \\ &= x(5x+2)^2 [2(5x+2) + 15x] \\ &= x(5x+2)^2 (25x+4) \end{aligned}$$

$$f) u = (2+x)^2 \quad ; \quad u' = 2(2+x)$$

$$v = (1-x)^3 \quad ; \quad v' = 3(1-x)^2 \cdot (-1) = -3(1-x)^2$$

$$\begin{aligned} f'(x) &= 2(2+x)(1-x)^3 + (2+x)^2 \cdot (-3(1-x)^2) \\ &= (2+x)(1-x)^2 [2(1-x) - 3(2+x)] \\ &= (2+x)(1-x)^2 [-4-5x] \\ &= -(2+x)(1-x)^2 (4+5x) \end{aligned}$$

$$\begin{aligned} 8) \quad u &= (2x+5)^3; & u' &= 3(2x+5)^2 \cdot 2 = 6(2x+5)^2 \\ v &= (3x-1)^4; & v' &= 4(3x-1)^3 \cdot 3 = 12(3x-1)^3 \end{aligned}$$

$$\begin{aligned} f'(x) &= 6(2x+5)^2(3x-1)^4 + (2x+5)^3 \cdot 12(3x-1)^3 \\ &= 6(2x+5)^2(3x-1)^3 \left[(3x-1) + 2(2x+5) \right] \\ &= 6(2x+5)^2(3x-1)^3 (7x+9) \end{aligned}$$