

Nr. 3) a) $f(x) = \frac{1}{(x-1)^3} = 1 \cdot (x-1)^{-3}$

$$f'(x) = -3 \cdot (x-1)^{-4} = \frac{-3}{(x-1)^4}$$

b) $f(x) = \frac{1}{(1-x)^3} = 1 \cdot (1-x)^{-3}$

$$f'(x) = -3 \cdot (1-x)^{-4} \cdot (-1) = \frac{3}{(1-x)^4}$$

c) $f(x) = \frac{1}{(3x+2)^2} = (3x+2)^{-2}$

$$f'(x) = -2 \cdot (3x+2)^{-3} \cdot 3 = \frac{-6}{(3x+2)^3}$$

d) $f(x) = \frac{1}{3(x+2)^2} = \frac{1}{3} \cdot (x+2)^{-2}$

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

e) $f(x) = \sqrt{x+3} = (x+3)^{\frac{1}{2}} \Rightarrow f'(x) = \frac{1}{2}(x+3)^{-\frac{1}{2}}$

$$f'(x) = \frac{1}{2\sqrt{x+3}}$$

f) $f(t) = \sqrt{3t+1} = (3t+1)^{\frac{1}{2}} \Rightarrow f'(t) = \frac{1}{2}(3t+1)^{-\frac{1}{2}} \cdot 3$

$$f'(t) = \frac{3}{2\sqrt{3t+1}}$$

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

$$f'(x) = \frac{1}{2} \cdot (5x^2+1)^{-\frac{1}{2}} \cdot 10x = \frac{10x}{2\sqrt{5x^2+1}} = \frac{5x}{\sqrt{5x^2+1}}$$

h) $g(t) = \frac{1}{\sin(t)} = (\sin(t))^{-1}$

$$g'(t) = -1 \cdot \sin(t)^{-2} \cdot \cos(t) = \frac{-\cos(t)}{(\sin(t))^2} = \frac{-\cos(t)}{\sin^2(t)}$$