

$$1) h(x) = f + 2g$$

$$h'(x) = f' + 2g'$$

$$h'(3) = 4 + 2(-1) = \boxed{2}$$

$$2) h(x) = f g(x)$$

$$h'(x) = f g' + f' g$$

$$h'(2) = 5 \cdot 3 + 3 \cdot 1 = \boxed{8}$$

$$3) h(x) = \frac{f(x)}{g(x)}$$

$$h'(x) = \frac{g(x) f'(x) - f(x) g'(x)}{[g(x)]^2}$$

$$h'(0) = \frac{5 \cdot 1 - 2 \cdot (-4)}{25} = \boxed{\frac{13}{25}}$$

$$4) h(x) = \sqrt{f(x)} = [f(x)]^{\frac{1}{2}}$$

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

$$h'(3) = \frac{4}{2\sqrt{10}} = \boxed{\frac{2}{\sqrt{10}}}$$

$$5) h(x) = f(g(x))$$

$$h'(x) = f'(g(x))g'(x)$$

$$h'(1) = 4 \cdot -3 = \boxed{-12}$$

$$6) h(x) = f(x^3)$$

$$h'(x) = 3x^2 f'(x^3)$$

$$h'(1) = 3 \cdot 2 = \boxed{6}$$

$$7) h(x) = \frac{1}{g} = g^{-1}$$

$$h'(x) = -1g^{-2} \cdot g'$$

$$h'(1) = \frac{-3}{9} = \boxed{-\frac{1}{3}}$$

$$8) y = \frac{2-x}{3x+1}$$

$$y' = \frac{(3x+1)(-1) - (2-x)(3)}{(3x+1)^2}$$

$$\frac{-3x-1-6+3x}{(3x+1)^2}$$

$$\frac{-7}{(3x+1)^2}$$

$$(13) y = (3x^4 + 5)^{10}$$

$$y' = 10(3x^4 + 5)^9 (12x^3)$$

$$y' = 120x^3 (3x^4 + 5)^9$$

$$(14) y = \sqrt{\frac{3x-4}{x+1}}$$

$$y' = \frac{1}{2} \left(\frac{3x-4}{x+1} \right)^{-\frac{1}{2}} \left(\frac{(x+1) \cdot 3 - 3x-4}{(x+1)^2} \right)$$

Ex

$$y = \frac{(3x-4)^{\frac{1}{2}}}{(x+1)^{\frac{1}{2}}}$$

$$y' = \frac{\sqrt{x+1} \cdot \frac{1}{2}(3x-4)^{-\frac{1}{2}}(3) - \sqrt{3x-4} \cdot \frac{1}{2}(x+1)^{-\frac{3}{2}}}{x+1}$$

$$(15) y = x^4 \sin x^2$$

$$y' = x^4 \cos x^2 \cdot 2x + 4x^3 \sin x^2$$

$$y' = 2x^5 \cos(x^2) + 4x^3 \sin(x^2)$$

$$(16) y = \frac{x+5}{\tan x}$$

$$y' = \frac{\tan x - (x+5) \sec^2 x}{\tan^2 x}$$

$$17) y = \sqrt{3 \sin t} = (3 \sin t)^{\frac{1}{2}}$$

$$y' = \frac{1}{2} (3 \sin t)^{-\frac{1}{2}} \cdot 3 \cos t = \frac{3 \cos t}{2 \sqrt{3 \sin t}}$$

$$18) y = (x^2 + 5)^5 \quad \text{FIND } y''$$

$$y' = 5(x^2 + 5)^4 (2x)$$

$$y' = 10x(x^2 + 5)^4$$

$$y'' = 10(x^2 + 5)^4 + 40x(x^2 + 5)^3 (2x)$$

$$y'' = 10(x^2 + 5)^4 + 80x^2(x^2 + 5)^3$$

$$19) y = (2x + 1)^3$$

$$y' = 3(2x + 1)^2 (2) = 6(2x + 1)^2 = 6(4x^2 + 4x + 1)$$

$$y' = 24x^2 + 24x + 6$$

$$\perp \Rightarrow x + 24y = 48$$

$$24y = -x + 48$$

$$y = \left(-\frac{1}{24}x\right) + 2$$

$$\perp = 24$$

$$24x^2 + 24x + 6 = 24$$

$$24x^2 + 24x - 18 = 0$$

$$6(4x^2 + 4x - 3) = 0$$

$$6(2x + 3)(2x - 1) = 0$$

$$x = -\frac{3}{2} \quad x = \frac{1}{2}$$

$$20) s(t) = t^3 - 6t^2 - 15t + 4$$

$$-2 \leq t \leq 10$$

$$a) v(t) = 3t^2 - 12t - 15$$

$$a(t) = 6t - 12$$

$$b) 6t - 12 = 0$$

$$t = 2$$

$$v(2) = 3(2)^2 - 12(2) - 15$$

$$v(2) = -27$$

$$c) -2 \leq t \leq 10$$

$$\text{START AT } s(-2) = 2$$

$$\text{END AT } s(10) = 254$$

$$\text{DISPLACEMENT} = 252$$

$$d) v(t) = 0$$

$$3t^2 - 12t - 15 = 0$$

$$3(t^2 - 4t - 5) = 0$$

$$3(t - 5)(t + 1) = 0$$

$$t = 5 \quad t = -1$$

t	s(t)	
-2	2	} 10
-1	12	
5	-96	} 350
10	254	

$$\text{TOTAL DISTANCE} = 468$$