(3)

$$y = 6x(3x^2-5x)$$

$$y' = 6x(6x-5) + (3x^2-5x)(6)$$

(7)

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

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

(11)

Method 1

$$V = (h^3-1)(2h^2-h-1)$$

$$V' = (h^3-1)(4h-1) + (2h^2-h-1)(3h^2)$$

$$= 4h^4-h^3-4h+1 + 6h^4-3h^3-3h^2$$

$$= 10h^4-4h^3-3h^2-4h+1$$

Method 2

$$V = (h^3-1)(2h^2-h-1)$$

$$= 2h^5-h^4-h^3-2h^2+h+1$$

$$V' = 10h^4-4h^3-3h^2-4h+1$$

(15) $$y = \frac{\pi}{2x^2+1}$$

$$y' = \frac{(2x^2+1)(0) - \pi(4x)}{(2x^2+1)^2}$$

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

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

$$y' = \frac{(3x^2+2)(2) - \overset{6x(2x-1)}{\cancel{(2x-1)(6x)}}}{(3x^2+2)^2}$$

$$= \frac{6x^2+4 - 12x^2 + 6x}{(3x^2+2)^2}$$

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

(23) $y = \dfrac{2x^2 - x - 1}{x^3 + 2x^2}$

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

$$= \frac{4x^4 - x^3 + 8x^3 - 2x^2 + (-2x^2+x+1)(3x^2+4x)}{(x^3+2x^2)^2}$$

$$= \frac{4x^4 + 7x^3 - 2x^2 - 6x^4 - 8x^3 + 3x^3 + 4x^2 + 3x^2 + 4x}{(x^3+2x^2)^2}$$

$$= \frac{-2x^4 + 2x^3 + 5x^2 + 4x}{(x^3+2x^2)^2}$$

or $\dfrac{x(-2x^3+2x^2+5x+4)}{[x^2(x+2)]^2}$

$$= \frac{x(-2x^3+2x^2+5x+4)}{x^4(x+2)^2}$$

$$= \frac{-2x^3+2x^2+5x+4}{x^3(x+2)^2}$$

(27) $y = (2x^2 - x + 1)(4 - 2x - x^2)$

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

$y'|_{x=-3} = (22)(4) + (1)(-13)$

$= 75$

(31) $s = \dfrac{2n^3 - 3n + 8}{2n - 3n^4}$

$s' = \dfrac{(2n - 3n^4)(6n^2 - 3) - (2n^3 - 3n + 8)(2 - 12n^3)}{(2n - 3n^4)^2}$

$s'|_{n=-1} = \dfrac{-5(3) - (9)(14)}{(-5)^2}$

$= \dfrac{-141}{25}$

$= -5.64$

(39) Method 1

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

$$y' = \frac{(3x-7)\frac{d}{dx}\left[x^2(1-2x)\right] - x^2(1-2x)(3)}{(3x-7)^2}$$

$$= \frac{(3x-7)\left[x^2(-2) + (1-2x)(2x)\right] - 3x^2(1-2x)}{(3x-7)^2}$$

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

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

$$= \frac{-18x^3 + 6x^2 + 42x^2 - 14x - 3x^2 + 6x^3}{(3x-7)^2}$$

$$= \frac{-12x^3 + 45x^2 - 14x}{(3x-7)^2}$$

Method 2 next page $\longrightarrow$

(39) Method 2

$$y = \frac{x^2 - 2x^3}{3x - 7}$$

$$y' = \frac{(3x-7)(2x-6x^2) - \overset{3(x^2-2x^3)}{\cancel{(x^2-2x^3)(3)}}}{(3x-7)^2}$$

$$= \frac{(6x^2 - 18x^3 - 14x + 42x^2) - 3x^2 + 6x^3}{(3x-7)^2}$$

$$= \frac{-12x^3 + 45x^2 - 14x}{(3x-7)^2}$$

Method 2 is faster than Method 1.

(41)

$$y = (4x+1)(x^4-1)$$

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

$$y'\big|_{x=-1} = (-3)(-4) + (0)(4)$$

$$= 12$$

(47)

$$i = \frac{8R}{7R+12}$$

$$i' = \frac{(7R+12)(8) - 8R(7)}{(7R+12)^2}$$

$$= \frac{56R + 96 - 56R}{(7R+12)^2}$$

$$= \frac{96}{(7R+12)^2}$$

(49)

$$s = (t^2 - 8t)(2t^2 + t + 1)$$

$$v = (t^2 - 8t)(4t + 1) + (2t^2 + t + 1)(2t - 8)$$

$$= 4t^3 + t^2 - 32t^2 - 8t$$
$$+ 4t^3 - 16t^2 + 2t^2 - 8t + 2t - 8$$

$$= 8t^3 - 45t^2 - 14t - 8$$