

ĐẠO HÀM

$$1: y = \left(\frac{1}{2}x^5 + \frac{2}{3}x^4 - x^3 - \frac{3}{2}x^2 + 4x - 5 \right)$$

$$y' = \left(\frac{1}{2}x^5 + \frac{2}{3}x^4 - x^3 - \frac{3}{2}x^2 + 4x - 5 \right)' \Leftrightarrow y' = \left(\frac{1}{2}x^5 \right)' + \left(\frac{2}{3}x^4 \right)' - (x^3)' - \left(\frac{3}{2}x^2 \right)' + (4x)' - 5'$$

$$y' = \frac{5}{2}x^4 + \frac{8}{3}x^3 - 3x^2 - 3x + 4.$$

$$2: y = \frac{1}{4} - \frac{1}{3}x + x^2 - 0,5x^4$$

$$y' = \left(\frac{1}{4} - \frac{1}{3}x + x^2 - 0,5x^4 \right)'$$

$$\Leftrightarrow y' = \left(\frac{1}{4} \right)' - \left(\frac{1}{3}x \right)' + (x^2)' - (0,5x^4)'$$

$$\Leftrightarrow y' = -\frac{1}{3} + 2x - 2x^3.$$

$$3: y = 2x^4 - \frac{1}{3}x^3 + 2\sqrt{x} - 5$$

$$y' = \left(2x^4 - \frac{1}{3}x^3 + 2\sqrt{x} - 5 \right)' \Leftrightarrow y' = (2x^4)' - \left(\frac{1}{3}x^3 \right)' + (2\sqrt{x})' - 5' \Leftrightarrow y' = 8x^3 - x^2 + \frac{1}{\sqrt{x}}.$$

$$4: y = \frac{x^4}{4} - \frac{x^3}{3} + \frac{1}{2}x^2 - x + a \text{ (a là hằng số)}$$

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

$$5: y = \frac{3}{x^2} - \sqrt{x} + \frac{2}{3}x\sqrt{x}$$

$$y' = \left(\frac{3}{x^2} - \sqrt{x} + \frac{2}{3}x\sqrt{x} \right)' \Leftrightarrow y' = (3x^{-2})' - (\sqrt{x})' + \frac{2}{3}(x\sqrt{x})'$$

$$\Leftrightarrow y' = 3 \cdot (-2) \cdot x^{-3} - \frac{1}{2\sqrt{x}} + \frac{2}{3}(x' \cdot \sqrt{x} + (\sqrt{x})' \cdot x) \Leftrightarrow y' = \frac{-6}{x^3} - \frac{1}{2\sqrt{x}} + \frac{2}{3} \left(\sqrt{x} + \frac{1}{2\sqrt{x}} \cdot x \right)$$

$$\Leftrightarrow y' = \frac{-6}{x^3} - \frac{1}{2\sqrt{x}} + \frac{2}{3} \left(\sqrt{x} + \frac{\sqrt{x}}{2} \right) = \frac{-6}{x^3} - \frac{1}{2\sqrt{x}} + \sqrt{x}.$$

$$6: y = 2x^4 - \frac{1}{3}x^3 + 2\sqrt{x} - 5$$

$$y' = \left(2x^4 - \frac{1}{3}x^3 + 2\sqrt{x} - 5 \right)' \Leftrightarrow y' = (2x^4)' - \left(\frac{1}{3}x^3 \right)' + (2\sqrt{x})' - 5' \Leftrightarrow y' = 8x^3 - x^2 + \frac{1}{\sqrt{x}}.$$

$$7: y = x^5 - 4x^3 + 2x - 3\sqrt{x}$$

$$y' = \left(x^5 - 4x^3 + 2x - 3\sqrt{x} \right)' \Leftrightarrow y' = (x^5)' - 4(x^3)' + 2x' - 3(\sqrt{x})' \Leftrightarrow y' = 5x^4 - 12x + 2 - \frac{3}{2\sqrt{x}}.$$

Bài 2: Tính đạo hàm của các hàm số sau:

a). $y = (x^2 + 3x)(2 - x)$. b) $y = (2x - 3)(x^5 - 2x)$ c). $y = (x^2 + 1)(5 - 3x^2)$

d). $y = x(2x - 1)(3x + 2)$ e). $y = (x^2 - 2x + 3)(2x^2 + 3)$ f). $y = x^2\sqrt{x}$

g) $y = \frac{2x-1}{4x-3}$ h) $y = \frac{2x+10}{4x-3}$ k). $y = \frac{3}{2x+1}$ l). $y = \frac{2x+1}{1-3x}$

m). $y = \frac{1+x-x^2}{1-x+x^2}$ n). $y = \frac{x^2-3x+3}{x-1}$ o). $y = \frac{2x^2-4x+1}{x-3}$

LỜI GIẢI

a). $y = (x^2 + 3x)(2 - x)$.

$$y' = \left[(x^2 + 3x)(2 - x) \right]' = (x^2 + 3x)' \cdot (2 - x) + (x^2 + 3x) \cdot (2 - x)'$$
$$= (2x + 3)(2 - x) + (x^2 + 3x)(-1) = -3x^2 - 2x + 6.$$

b). $y = (2x - 3)(x^5 - 2x)$

$$y' = \left[(2x - 3)(x^5 - 2x) \right]' = (2x - 3)' (x^5 - 2x) + (x^5 - 2x)' (2x - 3)$$
$$= 2(x^5 - 2x) + (5x^4 - 2)(2x - 3) = 12x^5 - 15x^4 - 8x + 6.$$

c). $y = (x^2 + 1)(5 - 3x^2)$

$$y' = \left[(x^2 + 1)(5 - 3x^2) \right]' = (x^2 + 1)' (5 - 3x^2) + (5 - 3x^2)' (x^2 + 1)$$
$$= 2x(5 - 3x^2) - 6x(x^2 + 1) = 10x - 6x^3 - 6x^3 - 6x = -12x^3 + 4x.$$

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

$$y' = \left[(2x^2 - x)(3x + 2) \right]' = (2x^2 - x)' (3x + 2) + (3x + 2)' (2x^2 - x)$$
$$= (4x - 1)(3x + 2) + 3(2x^2 - x) = 18x^2 + 2x - 2.$$

e). $y = (x^2 - 2x + 3)(2x^2 + 3)$

$$y' = \left[(x^2 - 2x + 3)(2x^2 + 3) \right]' = (x^2 - 2x + 3)' (2x^2 + 3) + (2x^2 + 3)' (x^2 - 2x + 3)$$
$$= (4x - 2)(2x^2 + 3) + (4x)(x^2 - 2x + 3) = 12x^3 - 4x^2 + 24x - 6.$$

f) $y = x^2\sqrt{x}$

$$y' = (x^2\sqrt{x})' = (x^2)' \cdot \sqrt{x} + (x^2) \cdot (\sqrt{x})' \cdot x^2 = 2x \cdot \sqrt{x} + \frac{1}{2\sqrt{x}} \cdot x^2 = 2x\sqrt{x} + \frac{1}{2}x\sqrt{x} = \frac{5x\sqrt{x}}{2}.$$

g) $y = \frac{2x-1}{4x-3} \Rightarrow y' = \left(\frac{2x-1}{4x-3} \right)'$

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

h) $y = \frac{2x+10}{4x-3} \Rightarrow y' = \left(\frac{2x+10}{4x-3} \right)'$

$$= \frac{(2x+10)' \cdot (4x-3) - (4x-3)' \cdot (2x+10)}{(4x-3)^2} = \frac{2(4x-3) - 4(2x+10)}{(4x-3)^2} = \frac{-46}{(4x-3)^2}$$

$$\text{k). } y = \frac{3}{2x+1} \Rightarrow y' = 3 \cdot \left(\frac{1}{2x+1} \right)' = -3 \cdot \frac{(2x+1)'}{(2x+1)^2} = \frac{-6}{(2x+1)^2}.$$

$$\text{l). } y = \frac{2x+1}{1-3x} \Rightarrow y' = \left(\frac{2x+1}{1-3x} \right)'$$

$$y' = \frac{(2x+1)'(1-3x) - (1-3x)'(2x+1)}{(1-3x)^2} = \frac{2(1-3x) + 3(2x+1)}{(1-3x)^2} = \frac{5}{(1-3x)^2}.$$

$$\text{m). } y = \frac{1+x-x^2}{1-x+x^2} \Rightarrow y' = \left(\frac{1+x-x^2}{1-x+x^2} \right)'$$

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

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

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

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

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

$$= \frac{(4x-4)(x-3) - (2x^2-4x+1)}{(x-3)^2} = \frac{2x^2-12x+11}{(x-3)^2}.$$