Finndu 1. afleiðu (diffurkvóta) eftirfarandi falla

a) $f(x) = x^2 - x^3 + 4$

$$f'(x) = 2\cdot x^{2-1} - 3\cdot x^{3-1} + 0 = 2x - 3x^2 = \underline{\underline{-2x^2 + 2x}}$$

b) $f(x) = 3x^5 - 5x^3$

$$f'(x) = 5\cdot 3x^{5-1} - 3\cdot 5x^{3-1} = \underline{\underline{15x^4 - 15x^2}}$$

c) $f(x) = \frac{1}{2}x^4 - 4\sqrt{x}$ $= \frac{1}{2}x^4 - 4x^{1/2} \leftarrow$ Umrita

$$f'(x) = 4\cdot\frac{1}{2}x^{4-1} - \frac{1}{2}\cdot 4x^{1/2-1} = 2x^3 - 2x^{-1/2} = 2x^3 - \frac{2}{x^{1/2}} = \underline{\underline{2x^3 - \frac{2}{\sqrt{x}}}}$$

d) $f(x) = 2x - \frac{1}{x}$ $\xrightarrow{\text{Umrita}}$ $f(x) = 2x - x^{-1}$

$$f'(x) = 1\cdot 2x^{1-1} - (-1)\cdot x^{-1-1} = 2x^0 + x^{-2} = \underline{\underline{2 + \frac{1}{x^2}}}$$

e) $f(x) = \frac{1}{2x^2} - \frac{1}{3x^3}$ $\xrightarrow{\text{Umrita}}$ $f(x) = \frac{1}{2}\cdot x^{-2} - \frac{1}{3}\cdot x^{-3}$

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

f) $f(x) = \frac{4}{\sqrt{x}} + \frac{2}{x^4}$ $\xrightarrow{\text{Umrita}}$ $4\cdot x^{-1/2} + 2x^{-4}$

$$f'(x) = -\frac{1}{2}\cdot 4x^{-1/2-1} - 4\cdot 2x^{-4-1} = \underline{\underline{-\frac{2}{x^{3/2}} - \frac{8}{x^5}}}$$

g) $f(x) = x^3(x^2 - 3)$ $\xrightarrow{\text{Leysi upp sviga}}$

$$f(x) = x^3\cdot x^2 - 3x^3 = x^{3+2} - 3x^3 = x^5 - 3x^3$$

$$f'(x) = 5x^{5-1} - 3\cdot 3x^{3-1} = \underline{\underline{5x^4 - 9x^2}}$$

h) $f(x) = \sqrt{x}(2x^2 + \sqrt{x})$ $\xrightarrow{\text{leysi upp sviga}}$ $2x^2 \cdot x^{1/2} + x^{1/2} \cdot x^{1/2} = 2x^{5/2} + x$

$$f'(x) = \frac{5}{2} \cdot 2 \cdot x^{5/2 - 1} + 1 \cdot x^{1-1} = 5x^{3/2} + x^0 = \underline{\underline{5x^{3/2} + 1}}$$

j) $f(x) = \frac{x^2+2x}{x-2}$; $g(x) = x^2 + 2x$; $h(x) = x - 2$ Diffurregla

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

$$f(x) = \frac{g(x)}{h(x)} \Rightarrow f'(x) = \frac{(2x^{2-1} + 2x^{1-1}) \cdot (x-2) - (x^2+2x) \cdot (x^{1-1} - 0)}{(x-2)^2}$$

$$\Leftrightarrow f'(x) = \frac{(2x+2)(x-2) - (x^2+2x) \cdot 1}{(x-2)^2} = \frac{2x^2 - 4x + 2x - 4 - x^2 - 2x}{(x-2)^2} = \underline{\underline{\frac{x^2 - 4x - 4}{(x-2)^2}}}$$

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

Sama aðferð

$$f(x) = \frac{g(x)}{h(x)} \Rightarrow f'(x) = \frac{(2x^{2-1} - 0)(x^2+x) - (x^2 - 1)(2x^{2-1} + x^{1-1})}{(x^2+x)^2}$$

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

$$\Rightarrow f'(x) = \frac{(x+1)^2}{(x^2+x)(x+1) \cdot x} = \frac{x+1}{x^3+x^2} = \frac{(x+1)}{x^2(x+1)} = \underline{\underline{\frac{1}{x^2}}}$$