

Derivoimissääntöjä

1. $Dk = 0$ (k on vakio)

2. $Dkf(x) = kf'(x)$

3. $D(f(x) + g(x)) = f'(x) + g'(x)$

4. $Df(x)g(x) = f'(x)g(x) + f(x)g'(x)$

5. $D\frac{f(x)}{g(x)} = \frac{f'(x)g(x) - f(x)g'(x)}{(g(x))^2}$

5 $\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$

6) $h(x) = \frac{x^2 + 2x}{3x - 1}$, My. $3x - 1 \neq 0$
 $3x \neq 1$
 $x \neq \frac{1}{3}$

$$h'(x) = \frac{(2x+2)(3x-1) - (x^2+2x) \cdot 3}{(3x-1)^2} = \frac{6x^2 - 2x + 6x - 2 - (3x^2 + 6x)}{(3x-1)^2}$$

$$= \frac{6x^2 + 4x - 2 - 3x^2 - 6x}{(3x-1)^2}$$

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

4 $(fg)' = f'g + fg'$

Esim. Derivoi,

a) $h(x) = (x^2 + 2x)(3x - 1)$

$$h'(x) = (2x+2)(3x-1) + (x^2+2x) \cdot 3$$

$$= 6x^2 - 2x + 6x - 2 + 3x^2 + 6x$$

$$= \underline{\underline{9x^2 + 10x - 2}}$$

Esim.

$$f(x) = \frac{5}{x^3} = 5x^{-3}$$

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

$$= -15x^{-4} = -\frac{15}{x^4}$$

11.9



Määritä funktion $r(x) = \frac{2-x}{x^3}$ derivaatta-
funktion nollakohdat.

Mhj: $x \neq 0$

$$\begin{aligned}
 r'(x) &= \frac{-1 \cdot x^3 - (2-x) \cdot 3x^2}{(x^3)^2} \\
 &= \frac{-x^3 - (6x^2 - 3x^3)}{x^6} \\
 &= \frac{-x^3 - 6x^2 + 3x^3}{x^6} \\
 &= \frac{2x^3 - 6x^2}{x^6} = \frac{2x^2(x-3)}{x^6} = \frac{2(x-3)}{x^4}
 \end{aligned}$$

$$\begin{aligned}
 f'(x) &= 0, \text{ kun} \\
 2(x-3) &= 0 \quad || : 2 \\
 x-3 &= 0 \\
 \underline{\underline{x=3}}
 \end{aligned}$$