

## II osa lk. 49 HARJUTUSÜLESANDED

### Ülesanne 1

Täida tabel.

$c' = 0$	$(e^x)' = e^x$	$(\cos x)' = -\sin x$
$x' = 1$	$(a^x)' = a^x \ln a$	$(\tan x)' = \frac{1}{\cos^2 x}$
$\left(\frac{1}{x}\right)' = -\frac{1}{x^2}$	$(\ln x)' = \frac{1}{x}$	$(\cot x)' = -\frac{1}{\sin^2 x}$
$(\sqrt{x})' = \frac{1}{2\sqrt{x}}$	$(\log_a x)' = \frac{1}{x \ln a}$	$F'(x) = f'(u) \cdot g'(x)$ , kus $u = g(x)$
$(x^n)' = n \cdot x^{n-1}$	$(\sin x)' = \cos x$	

### Ülesanne 2

Leia funktsiooni tuletis.

a)  $f(x) = 1 + \sqrt{x}$

$$f'(x) = 0 + \frac{1}{2\sqrt{x}} = \frac{1}{2\sqrt{x}}$$

b)  $y = \frac{1-x^3}{\pi}$

$$y' = \left( \frac{1}{\pi} - \frac{1}{\pi} x^3 \right)' = 0 - \frac{3x^2}{\pi} = -\frac{3x^2}{\pi}$$

c)

$$y = e^{2x}$$

$$y' = (2x)' \cdot e^{2x} = 2e^{2x}$$

d)  $y = 3^x + \ln x$

$$y' = 3^x \ln 3 + \frac{1}{x}$$

**e)**

$$y = \frac{1 - \sin^2 x}{\cos^2 x} = \frac{\cos^2 x}{\cos^2 x} = 1$$

$$y' = 0$$

**f)**

$$y = \frac{x^5}{1-x}$$

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

**g)**  $f(x) = \frac{(\sqrt{x}-1)^2}{x}$

$$f'(x) = \frac{\left[ (\sqrt{x}-1)^2 \right]' \cdot x - (x-2\sqrt{x}+1) \cdot x'}{x^2} = \frac{\left( 1 - \frac{1}{\sqrt{x}} \right) \cdot x - (x-2\sqrt{x}+1) \cdot 1}{x^2} = \frac{x - \sqrt{x} - x + 2\sqrt{x} - 1}{x^2} = \frac{\sqrt{x} - 1}{x^2}$$

**h)**

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

$$y' = 4(x^2 - 1)^3 \cdot 2x = 8x(x^2 - 1)^3$$

**i)**

$$y = 2\sin^2 x$$

$$y' = 2 \cdot 2\sin x \cdot \cos x = 2\sin 2x$$