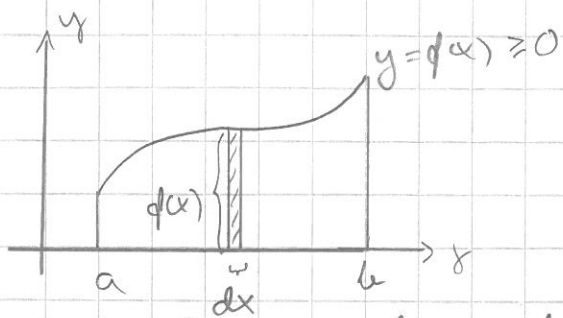


11. Käyrän ja x-akselin välinen alue



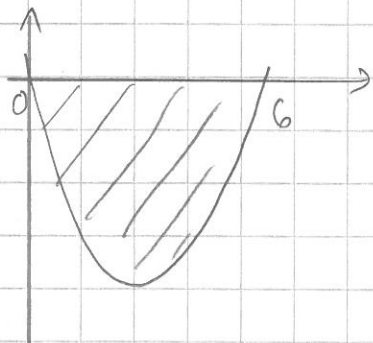
Pylvään:

- paksuus: dx
- korkeus: $f(x)$
- pinta-ala: $f(x)dx$

Lasketaan pienet pylväät yhteen eli integroidaan: $A = \int_a^b f(x) dx$

Huom. jos $f(x) \leq 0$, on $A = -\int_a^b f(x) dx$

11.13 $f(x) = x^2 - 6x = 0 \Leftrightarrow x(x-6) = 0 \Leftrightarrow x=0$ tai $x=6$



$$A = -\int_0^6 (x^2 - 6x) dx = -\left[\frac{1}{3}x^3 - 6 \cdot \frac{1}{2}x^2 \right]_0^6 = -\left[\left(\frac{1}{3} \cdot 6^3 - 3 \cdot 6^2 \right) - 0 \right] = \underline{36}$$

11.17 $A = \int_{-9.1}^{-6} f(x) dx + \int_{-6}^0 g(x) dx \stackrel{\leftarrow \text{geogebra}}{=} 29.9409$

$\Rightarrow$ pinta-ala: $29.9409 \cdot 0.04 \text{ km}^2$



$0.2 \text{ km} \cdot 0.2 \text{ km} = 0.04 \text{ km}^2$

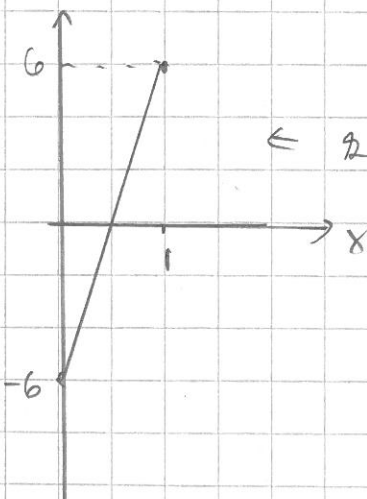
$= 1.1976 \text{ km}^2 \approx \underline{1.2 \text{ km}^2}$

11.20 $f: \underbrace{[0,1]}_{x \in [0,1]} \rightarrow \underbrace{\mathbb{R}}_{f(x) \in \mathbb{R}}$

1° f jatkuvuus

2° $f(x) = 6$ jollakin arvolla $x \in [0,1]$

3° $\int_0^1 f(x) dx = 0$



$\Leftarrow k = \frac{\Delta y}{\Delta x} = \frac{6 - (-6)}{1 - 0} = \frac{12}{1} = 12$

$f(x) = 12x - 6, 0 \leq x \leq 1$