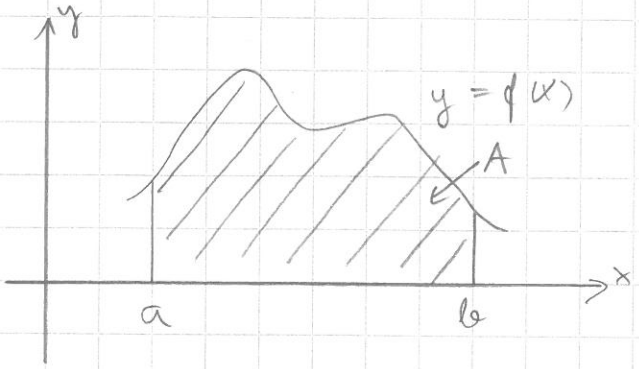
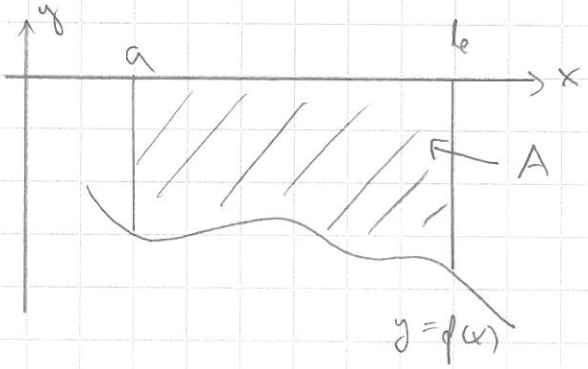
2. Määrätyn integraalin määritelmä



$f(x) \geq 0$

$$A = \int_a^b f(x)\,dx$$

"määrätty integraali a:sta b:hen $f(x)\,dx$"



$f(x) \leq 0$

$$A = -\int_a^b f(x)\,dx$$

Määrätyn integraalin ominaisuuksia:

1. $\int_a^b k f(x)\,dx = k\int_a^b f(x)\,dx$, k vakio
2. $\int_a^b (f(x)+g(x))\,dx = \int_a^b f(x)\,dx + \int_a^b g(x)\,dx$
3. $\int_a^a f(x)\,dx = 0$
4. $\int_a^b f(x)\,dx = \int_a^c f(x)\,dx + \int_c^b f(x)\,dx$
5. $\int_a^b f(x)\,dx = -\int_b^a f(x)\,dx$

2.2 $f(x) = -\underbrace{e^x}_{>0} < 0$ aina, $x \in [0,2]$, $n = 10$

a) alasumma: $s_{10} \approx -7{,}04924 \approx \underline{-7{,}05}$

yläsumma: $S_{10} \approx -5{,}77143 \approx \underline{-5{,}77}$

b) $-7{,}1 \leq \int_0^2 -e^x\,dx \leq -5{,}7$