

First Order ODE

$$\frac{dx(t)}{dt} = -2x(t), x(0) = 10$$

- Ditanyakan $x(t), t \geq 0$ (solusi)

- Analisis (penyelesaian analitik)

$$\int \frac{dx}{x} = \int -2 dt = -2t + C$$

$$\ln|x| = -2t + C \rightarrow \ln|x| = -2t + C$$

$$x(t) = e^{-2t+C} = e^C e^{-2t} = A e^{-2t}$$

$$x(0) = 10 \rightarrow A e^0 = A = 10$$

$$\int \frac{dx}{x} = \int x^{-1} dx = \ln|x|$$

$$\int x^2 dx = \frac{1}{3} x^3$$

$$\int x^{-2} dx = -x^{-1}$$

$$\frac{dx(t)}{x(t)} = -2 dt = -2 \int dt = -2t + C$$

$$\ln|x(t)| = -2t + C \rightarrow \ln|x(t)| = -2t + C$$

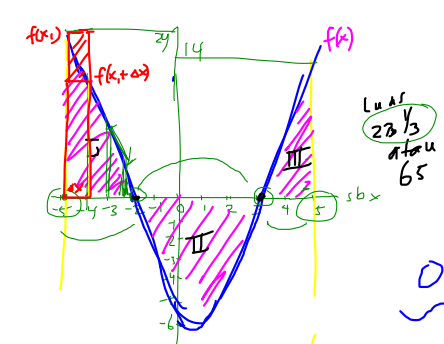
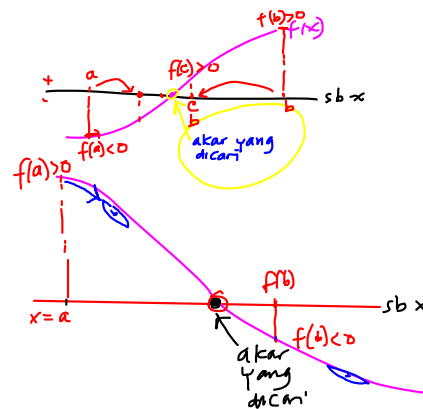
$$x(t) = e^{-2t+C} = e^C e^{-2t} = A e^{-2t}$$

$$x(0) = 10 \rightarrow A e^0 = A = 10$$

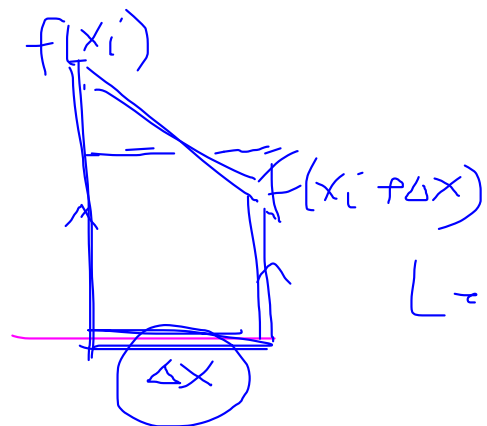
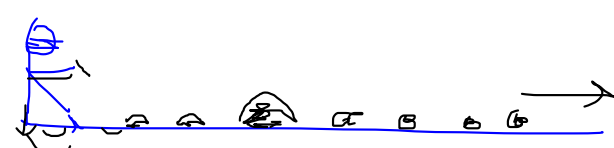
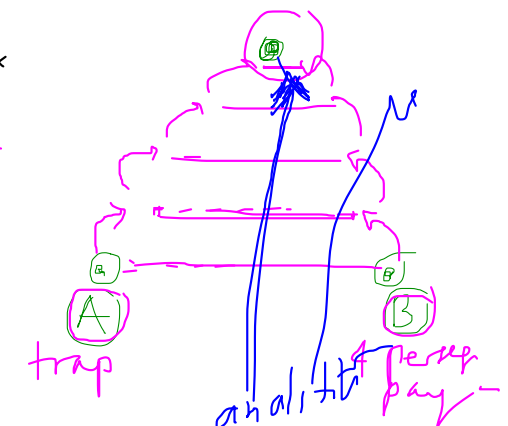
Solusi: $x(t) = 10e^{-2t}$ ← exact

Verifikasi: * Keadaan awal $x(0) = 10, 0K$

* $\frac{dx(t)}{dt} = -2 \cdot 10e^{-2t} = -2x(t)$



ode 45



$$L = \frac{f(x_i) + f(x_i + \Delta x)}{2} \Delta x$$

