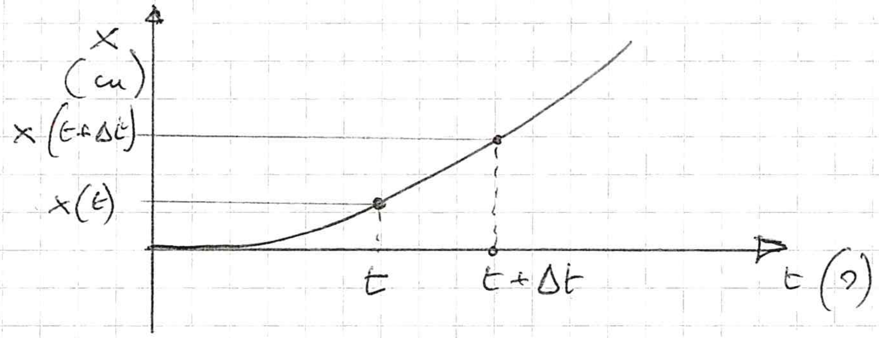
Derivate

$$x = At^2 \qquad [A] = \frac{[\text{lunghezza}]}{[\text{tempo}^2]}$$

$$V_x = \frac{dx}{dt} = \lim_{\Delta t \to 0} \frac{x(t+\Delta t) - x(t)}{\Delta t}$$



$$= \lim_{\Delta t \to 0} \frac{A(t+\Delta t)^2 - At^2}{\Delta t} =$$

$$= \lim_{\Delta t \to 0} \frac{\cancel{At^2} + A\Delta t^2 + 2At\Delta t \cancel{- At^2}}{\Delta t} =$$

$$= \lim_{\Delta t \to 0} (A\underbrace{\Delta t}_{\Delta \to 0} + 2At) = 2At$$

$$\frac{d}{dt}(At^2) = 2At$$

$$\frac{d}{dt}(At^3) = 3At^2$$

$$\frac{d}{dt}(At^n) = nAt^{(n-1)}$$

Altre derivate utili:

$$\frac{d}{dt}\,\mathrm{sen}\,\omega t = \omega \cos \omega t$$

$$\frac{d}{dt}\cos \omega t = -\omega\,\mathrm{sen}\,\omega t$$

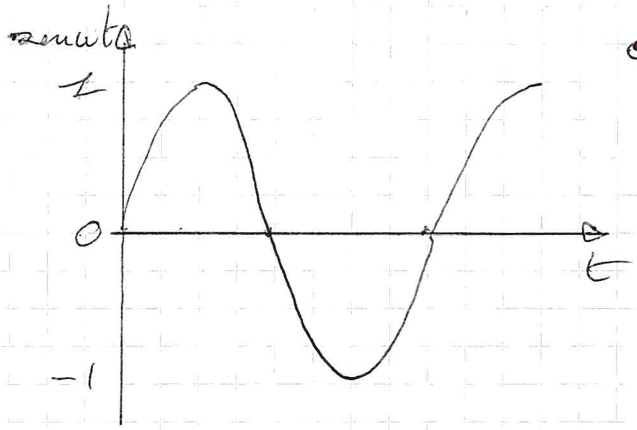
In generale:

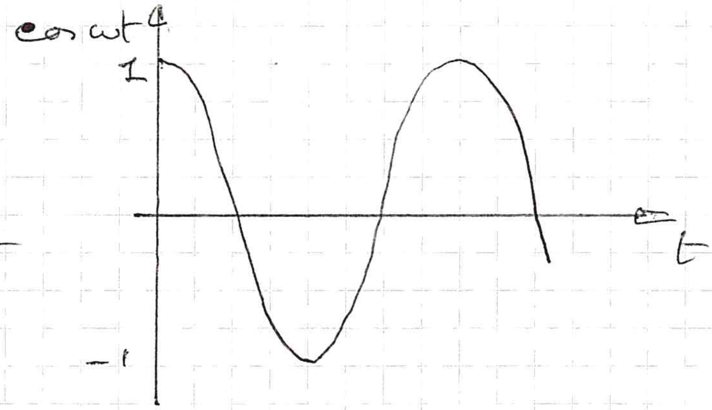
$$\frac{d}{dt}\,g(f(x)) = \frac{dg}{df}\cdot\frac{df}{dx}$$

Esempio

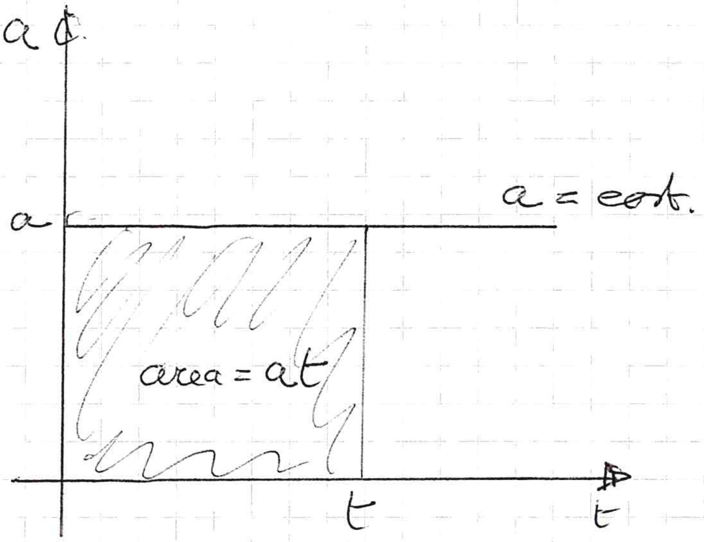
$$g(f) = \mathrm{sen}\, f$$
$$f(x) = \omega t$$

$$\frac{d}{dt}\,\mathrm{sen}\,\omega t = \frac{df}{dx}\cdot \cos\omega t$$
$$= \omega \cos \omega t$$

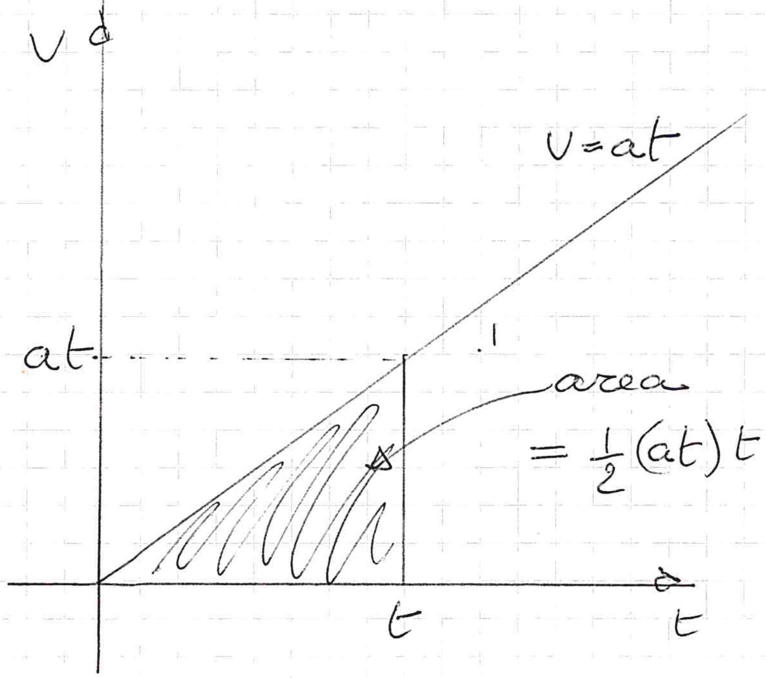




$a = 2 \ m/s^2$



$v = 2t \ m/s$



$x = \frac{1}{2} \cdot 2t^2 = t^2 \ m$