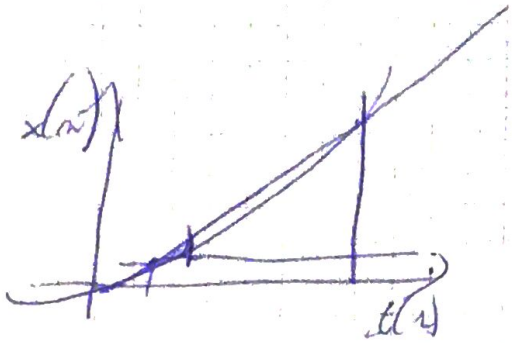
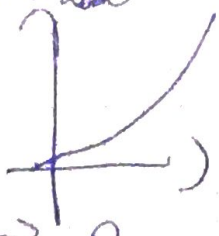
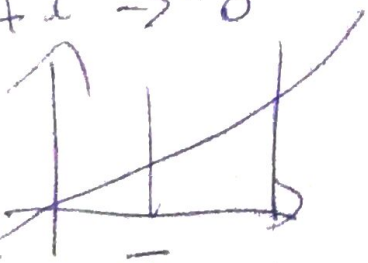
$\Delta x = 0$ ↓ ↑ $\Delta \neq 0$

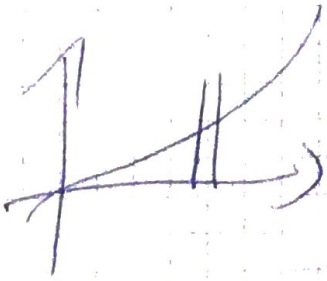


Velocità - Istantea

$x(t) =$ 

$\Delta t \to 0$





$v = \lim_{\Delta t \to 0} \bar{v}$

$= \lim_{\Delta t \to 0} \frac{\Delta x}{\Delta t}$

$= \frac{dx(t)}{dt}$

$= \tan(x(t))$

Accelerazione

Media

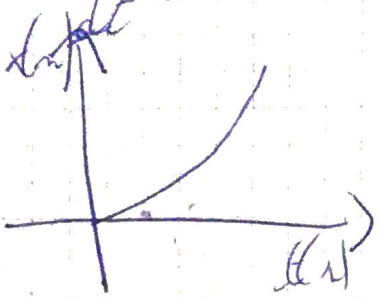
$$\frac{\Delta v}{\Delta t} = \overline{a}$$

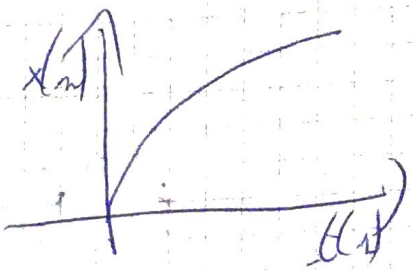
$$a = \frac{dv(t)}{dt}$$

$$a = \lim_{\Delta t \to 0} \frac{\Delta v}{\Delta t}$$

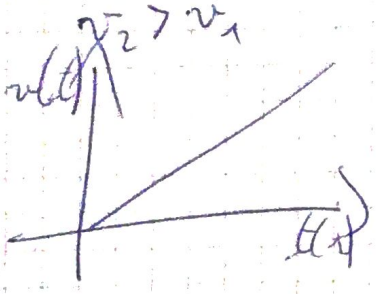
$$\frac{d}{dt}\frac{d}{dt}x(t)$$

$$\frac{d^2x}{dt^2}$$

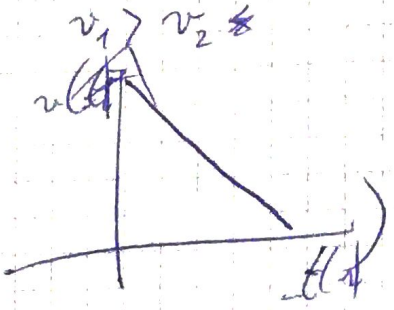


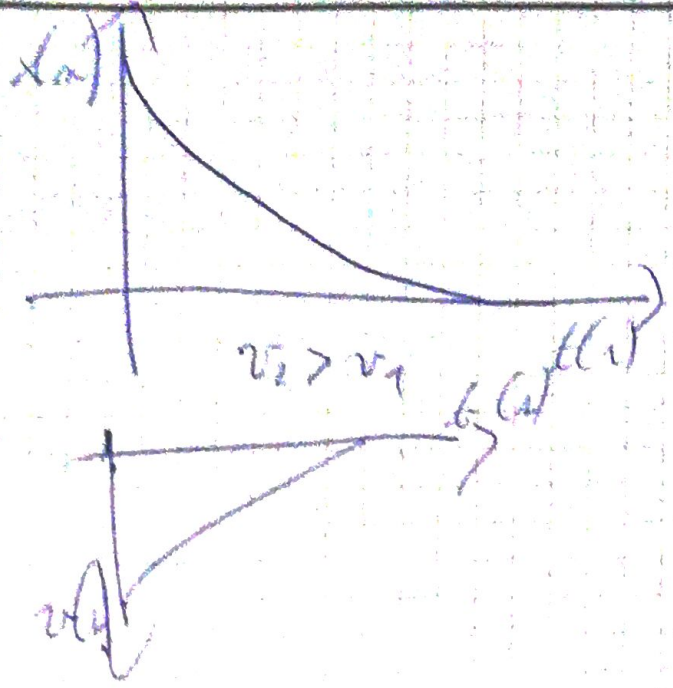


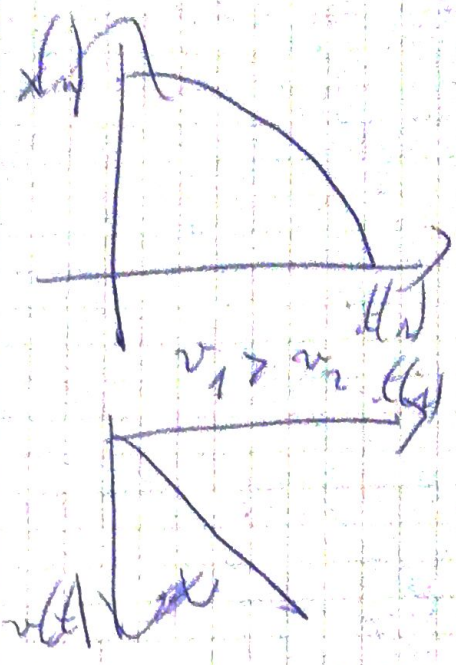
$v_2 > v_1$

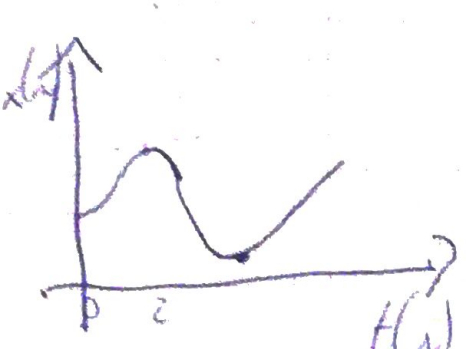


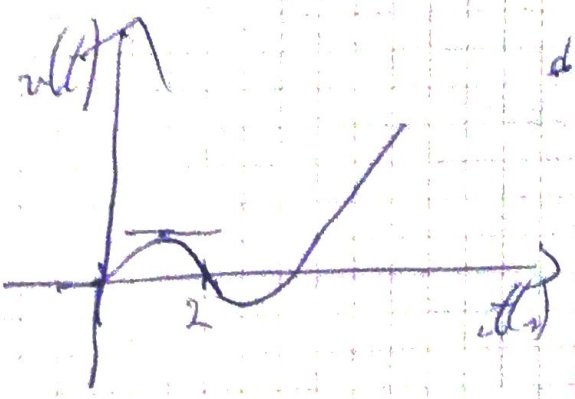
$v_1 > v_2$

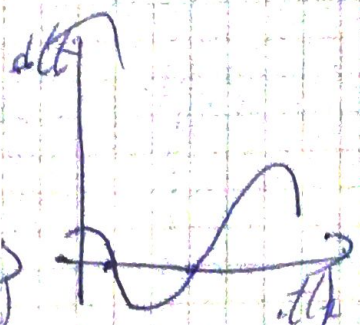












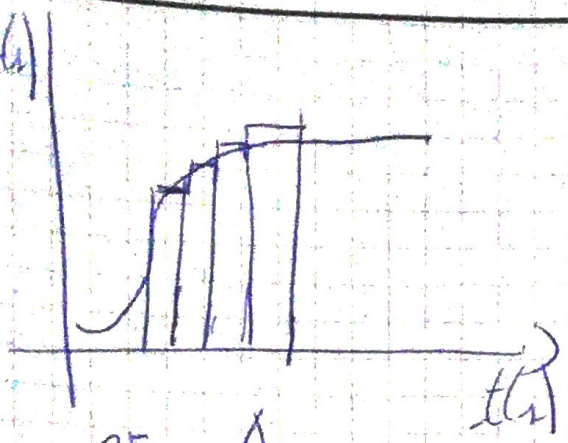
$0 - 2 > 0$

~

$x(t) \rightarrow v(t)$

$v(t) = \frac{dx}{dt}$

$a = \frac{dv}{dt}$



$$v_1 = \frac{\Delta x_1}{\Delta t_1}$$

$$v_2 = \frac{\Delta x^1}{\Delta t_2}$$

$$\Delta x \approx \Delta x_1 + \Delta x_2$$

$$\lim_{\Delta t \to 0} \Delta x_{tot;i} \approx \sum_{i=0}^{N} \Delta x_i \approx \sum_{i=0}^{14} v_i \Delta t_i$$

$$\Delta x = \sum_{i=1}^{\infty} v_i \Delta t_i$$

$$\int_{t_1}^{t_2} v(t)\, dt$$

NA - MI = 850 km

$v_1 = 150$ km/h $\Delta x = 200$ km

$v_2 = 180$ km/h $\Delta x = 350$ km

$v_3 = 100$ km $\Delta x = 300$ km

$t_{tot} = t_1 + t_2 + t_3$

$t_1 = \frac{\Delta x_1}{\Delta v_1}$ $t_2 = \frac{\Delta x_2}{\Delta v_2}$ $t_3 = \frac{\Delta x_3}{\Delta v_3}$

$\bar{v} = \frac{\Delta x}{\Delta t}$

$= \frac{850 km}{t_{tot}}$

$\Delta t_1 = \frac{\Delta_{tot}}{2}$ $v_1 = 80$ km/h $v_1 = v_1$

$\Delta t_2 = \frac{\Delta_{tot}}{2}$ $v_2 = 50$ km $v_2 = v_2$

$\bar{v} = \frac{\Delta x}{\Delta t}$ $\bar{v} = \frac{\Delta x}{\Delta t}$

$= \frac{v_1 \Delta t}{\Delta t 2} + \frac{v_2 \Delta t}{\Delta t 2}$

$\bar{v} = \frac{v_1 + v_2}{2 \Delta t}$

$$\Delta x_1 = \frac{\Delta x}{2}$$

$$\Delta x_2 = \frac{\Delta x}{2}$$

$$\Delta t_{TOT} = \Delta t_1 + \Delta t_2$$

$$\Delta t = \frac{\Delta x}{2v_1} + \frac{\Delta x}{2v_2}$$

$$\Delta t = \frac{\Delta x}{2}\left(\frac{1}{v_1} + \frac{1}{v_2}\right)$$

$x(t) = 0$

$v(t) = 0$

Uniform Rettilinear

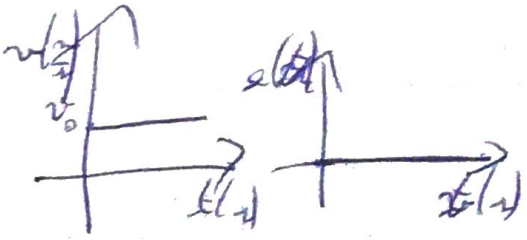
$v(t) = k$

$a(t) = 0$

$v(t) = k$

$\bar{v} = k$

$v(t) = \bar{v}$



$$\frac{\Delta x}{\Delta t} = \frac{x_2 - x_1}{t_2 - t_1}$$

$t_1 = 0 \quad x_0 = 0$

$t_2 = t \quad x_2 = x(t)$

$$v = \frac{x(t) - x_0}{t}$$

$x(t) = x_0 + v t$

$a = \frac{dv}{dt} \Rightarrow a = 0$ $\quad v = k$ $\quad v = \frac{dx}{dt}$ $\quad dx = v(t)\,dt$

$$\int_{x_0}^{x} dx = \int_0^t v(t)\,dt = \int_0^t v\,dt$$

$x(t) - x_0 = v \int a\,t$

$= v\,t$

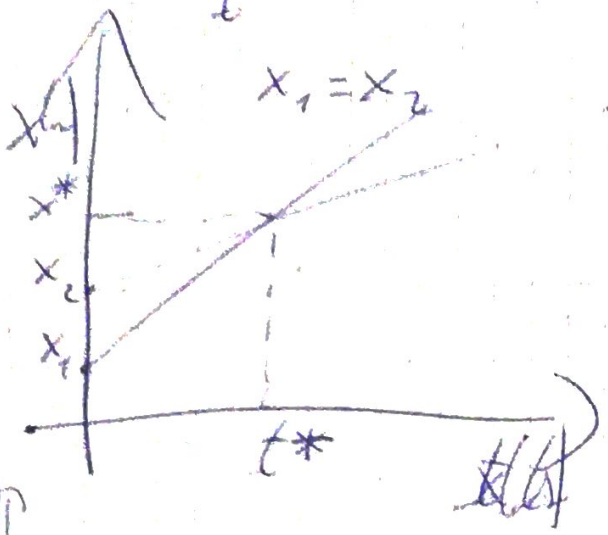
x_1 $x_2 > x_1$

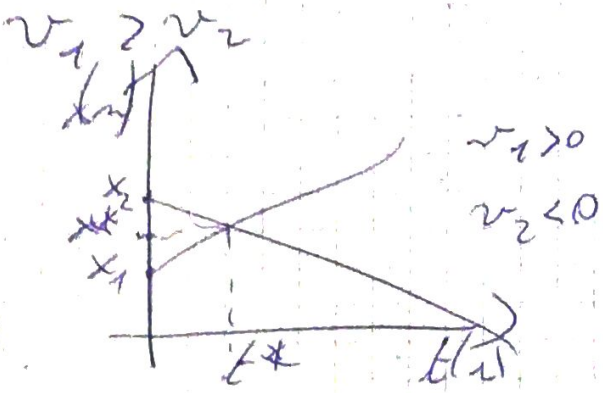
x_2 Moto Uniforme

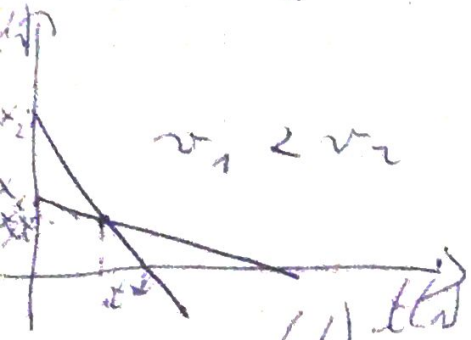
$v_1 = k$

$v_2 = k$

t







$x_1(t) = x_1 + v_1 t$

$x_2(t) = x_2 + v_2 t$

$x_1(t_1^*) = x_2(t_2^*)$

t^*

$x^* = x_1(t^*) = x_2(t^*) \dfrac{x_1^* - x_2^*}{v_2 - v_1}$

Rettilinea Uniformente Accelerata

$a = k$

$\frac{dv}{dt} = a$

$a = \frac{\Delta v}{\Delta t}$

$a = \frac{\Delta v}{\Delta t}$

$= \frac{v_2 - v_1}{t_2 - t_1}$

$v_2 = v(t)$

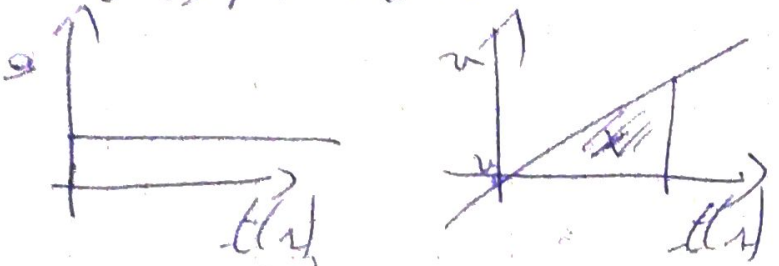
$v_1 = v_0$

$t_2 = t$

$t_1 = t_0$

$t_1 = 0$

$v(t) = v_0 + a \cdot t \qquad v = \int a \, dt$



$\Delta x = x(t) - x_0$

$x(t) = v_0 t + \frac{1}{2} a t^2$

$x(t) = \int_{v_0}^{v(t)} dv$

$= \int_0^t a \, dt$

$v(t) = v_0 + at$

$a = \frac{d^2 x(t)}{dt^2}$

$x(t) = \int v \, dt$

$x(t) = \int_0^t v_0 + at \, dt$

$x(t) = x_0 + v_0 t + \frac{1}{2} a t^2$

$v(t) = v_0 + at$

$v^2 - v_0^2 = 2a\Delta x$

$t = \frac{v(t) - v_0}{a}$

$x(t) = x_0 + \frac{v_0}{a}(v - v_0) + \frac{1}{2}a\frac{(v - v_0)^2}{a^2}$

$x_0 + \frac{v_0 v}{a} - \frac{v_0^2}{a} + \frac{1}{2}\frac{v^2}{a} + \frac{1}{2}\frac{v_0^2}{a} - \frac{v_0 v}{a}$

$x_0 = \frac{1}{2}\frac{v_0^2}{a} + \frac{v^2}{2a}$

$v_0 = 100 km/h$

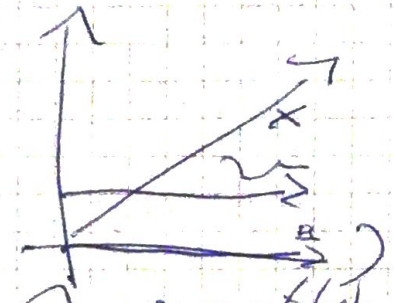
$a = -2 km/h/s$

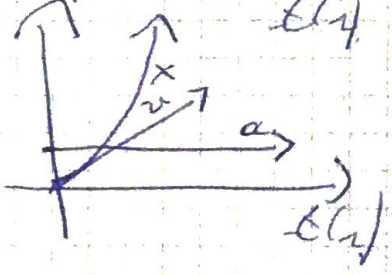
$\Delta x = ?$

$v = 80 km/h$

$v_{p0} = 0$

$a = 8 km/h/s$





$x(t) = vt \qquad x(t) = \frac{1}{2}at^2$

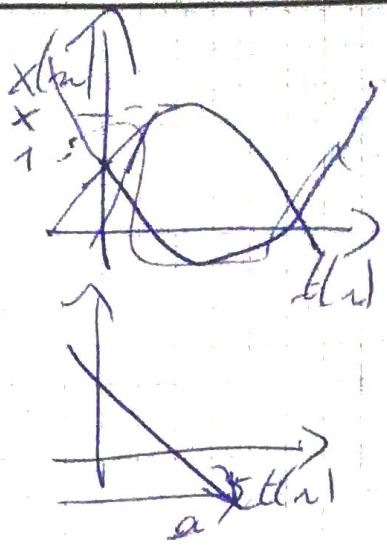
$vt = \frac{1}{2}at^2 \qquad v = at$

$v = \frac{1}{2}at$

$t = \frac{2v}{a} \qquad x(t) = vt$

$v = 2\ \frac{m}{s}$

$a = -k^2$



$v(t) = v_0 - gt$

$x(t) = \frac{1}{2} g t^2 + v_0 t$

$g = -10\ m/s^2$

t_1

t_2

$2\ t_1$

$v(t_2) = -v_0$

x_1 $v_0 = 0$

$v(t)$

$v(t) = 0$

$v_0 - gt$

$v_0 - gt = 0$

$2v_1 (-10\ m/s) \cdot t = 0$

$t = \frac{v_0}{g}$

$t = \frac{2\ m/s}{10\ m/s^2}$