x - pot

$x(t)$ - ovisnost puta o vremenu

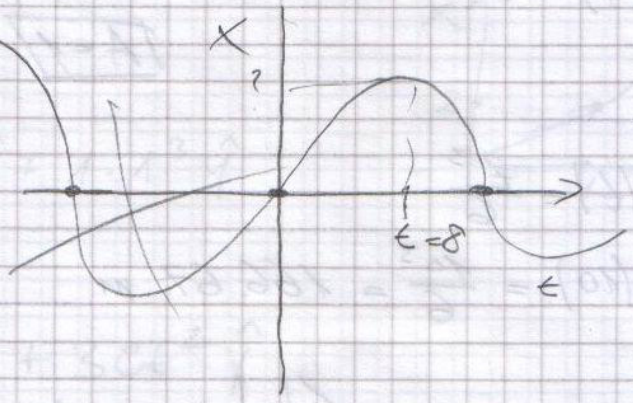
$$v(t) = \frac{dx(t)}{dt} = \dot{x}$$

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

(1.3) $x(t) = at - bt^3$

$a = 384\ m/s$

$b = 2\ m/s^3$



$at - bt^3 = 0$

$t(a - bt^2) = 0$

$t_1 = 0 \qquad t_2 = \pm\sqrt{\frac{a}{b}}$

$$\frac{dx}{dt} = 0 = a - 3bt^2$$

$$t = \pm\sqrt{\frac{a}{3b}}$$

$$\boxed{t_{ekstr.} = \sqrt{\frac{a}{3b}} = 8\,s}$$

$x(t) = at - bt^3$

$$\boxed{x = 2048\ m}$$

(1.4)

~~$t_1 = 0\ s$~~

~~$t_2 = 4\ s$~~ $\quad v(4\,s) = 8\ m/s$

~~$v_2 = 8\ m/s$~~

$x(10\,s) = ?$

MIROVANJE:

$x(0) = 0$

$v(0) = 0$

$a \sim t = a = A \cdot t$

$a = A \cdot t$

$$\frac{dv}{dt} = A \cdot t \,/\int dt$$

$$\int dv = \int A t\, dt$$

$$v + c_1 = \frac{At^2}{2} + c_2$$

$$v(t) = \frac{At^2}{2} + c^*$$

$v(0) = 0 \Rightarrow c^* = 0$

$$v(t) = \frac{At^2}{2}$$

$$\frac{dx}{dt} = \frac{At^2}{2} \,/\int dt$$

$$x(t) = \frac{At^3}{6} + c^{**}$$

$\Rightarrow$

$x(0)=0 \Rightarrow C^{**}=0$

$x(t)=\frac{At^3}{6}$

$v(t)=\frac{At^2}{2}$

$v(4)=8$

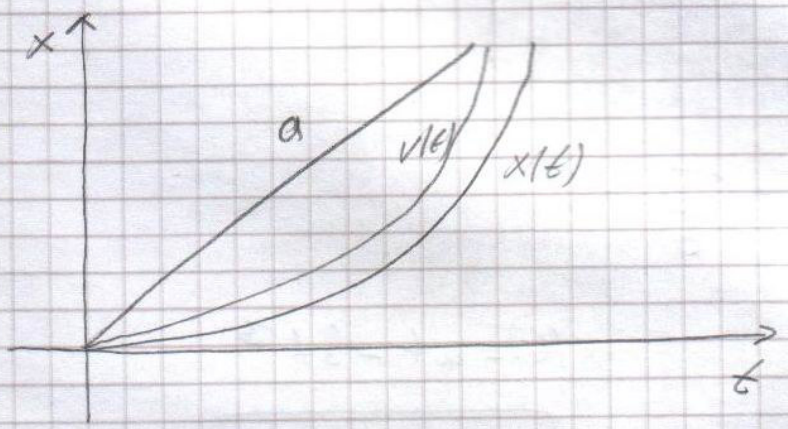
$\frac{A4^2}{2}=8$

$A16=16$

$\boxed{A=1}$

$x(t)=\frac{t^3}{6}$

$x(10)=\frac{10^3}{6}=166.67\ m$



$\frac{d^{20}x}{dt}=V \Rightarrow$ 20 x integrirati

20 poč. uvjeta

(1.2) $a \sim t = a=\alpha t$

$x(14s)=360\ m$

$v(14s)=?$

NIJE ZADAN KAKO TREBA?

↓

Koli informacija da li krece iz mirovanja ili iz neke tocke?

$a=At$

$\frac{dv}{dt}=At \ / \int dt$

$\int dv=\frac{At^2}{2} \ / \int dt$

$x=\frac{At^3}{6}$

$360=\frac{A14^3}{6}$

$A=0,7871$

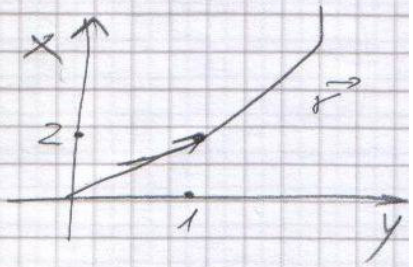
$v(14)=\frac{dx}{dt}=\frac{At^2}{2}$

$\boxed{v=77,13\ m/s}$

$\boxed{v=277,70\ km/h}$

P. Kulišić → riješeni zadaci iz mehanike i topline

(2.9) Čestica se giba u x,y ravnini tako da je vektor položaja $\vec{r} = (At^2 - Bt)\hat{x} + Ct^3\hat{y}$. $A = 3\ m/s^2$, $B = 1\ m/s$, $C = 1\ m/s^3$



a) $\vec{r}, \vec{v}, \vec{a}$ u 1. sekundi ?

$$\vec{r}(1s) = (3\cdot 1^2 - 1\cdot 1)\hat{x} + 1\cdot 1^3\hat{y}$$

$$\boxed{\vec{r}(1) = 2\hat{x} + \hat{y}}$$

$$\vec{v}(t) = (2At - B)\hat{x} + 3Ct^2\hat{y}$$

$$\vec{v}(1) = (6 - 1)\hat{x} + 3\hat{y}$$

$$\boxed{\vec{v}(1) = 5\hat{x} + 3\hat{y}}$$

$$\vec{a}(t) = 2A\hat{x} + 6Ct\hat{y}$$

$$\boxed{\vec{a}(1) = 6\hat{x} + 6\hat{y}}$$

b) Kada je x komponenta brzine = 0, kolika je tada y komponenta ?

$$\vec{v}(t) = \underbrace{(2At - B)}_{v_x}\hat{x} + \underbrace{3Ct^2}_{v_y}\hat{y}$$

$$2At - B = 0$$

$$\boxed{t = \frac{B}{2A}}$$

$$v_y = 3C\left(\frac{B}{2A}\right)^2$$

$$v_y = 3C\,\frac{B^2}{4A^2}$$

$$= 3\cdot 1\cdot \frac{1}{4\cdot 3^2}$$

$$\boxed{v_y = \frac{1}{12}\ m/s}$$