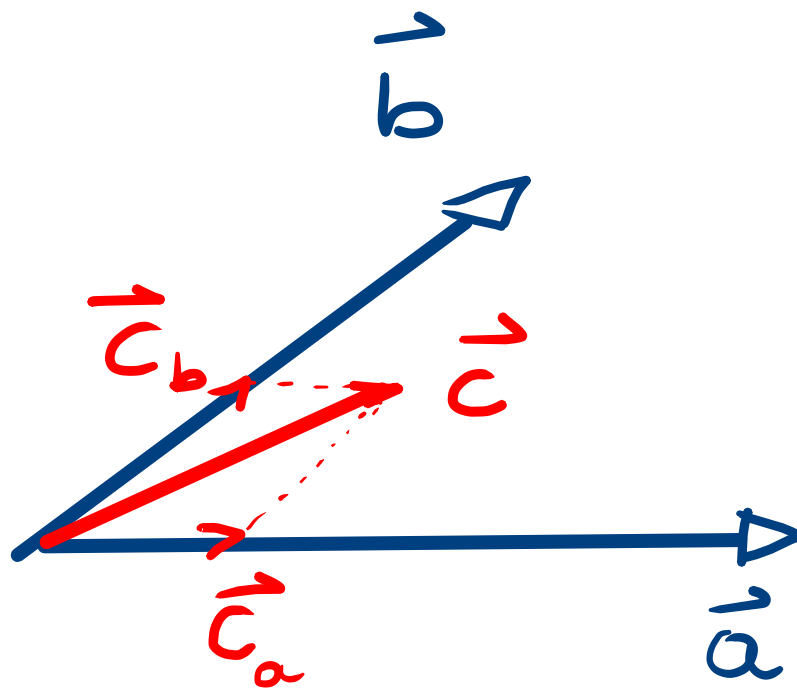


$$\vec{a} (a_1, a_2, a_3)$$

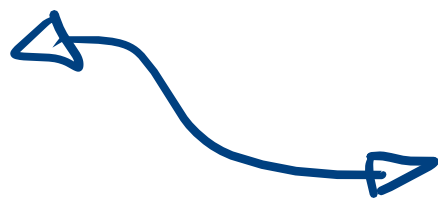
$$\vec{b} (b_1, b_2, b_3)$$

$$\vec{c} (c_1, c_2, c_3)$$



$$\vec{c} = \vec{c}_a + \vec{c}_b = k \cdot \vec{a} + l \vec{b}$$

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} = 0$$



συγγραφικό εργα

$$\{ \underbrace{v(x)} \}$$

$$v = 3x^2$$

$$a = ?$$

$$\{ \underbrace{a = a(x)} \}$$

ΛΑΘΟΣ!

~~$$a = 6x$$~~

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

$$v = v(x) \leadsto \frac{dx}{dt} = v(x) \leadsto \int \frac{dx}{v(x)} = \int dt \leadsto \left\{ \begin{array}{l} x = x(t) \\ t = t(x) \end{array} \right.$$

$$v = v(t) \leadsto \boxed{a = a(t)}$$

$$\vec{r}(t) = 3t \hat{i} + 5t^2 \hat{j} + 6t^3 \hat{k}$$

$$\vec{r}(t) = \underline{x(t)} \hat{i} + \underline{y(t)} \hat{j} + \underline{z(t)} \hat{k}$$

$$\left\{ \begin{array}{l} x(t) = 3t \\ y(t) = 5t^2 \\ z(t) = 6t^3 \end{array} \right\}$$

$$\rightarrow \vec{v}(t) = \frac{d\vec{r}}{dt} = \frac{d}{dt} (3t \hat{i} + 5t^2 \hat{j} + 6t^3 \hat{k}) = 3 \hat{i} + 10t \hat{j} + 18t^2 \hat{k}$$

$$\left\{ \begin{array}{l} \vec{r}(t) = \sin t \hat{i} + \cos t \hat{j} + 6t \hat{k} \\ \vec{v}(t) = \cos t \hat{i} - \sin t \hat{j} + 6 \hat{k} \\ \vec{a}(t) = -\sin t \hat{i} - \cos t \hat{j} + 0 \hat{k} \end{array} \right.$$

$$\vec{r} = \underbrace{x(t)}_{\text{red circle}} \hat{i} + \underbrace{5t}_{y(t)} \hat{j} + \underbrace{3x^2}_{z(t)} \hat{k}$$

$$\vec{r} = \underline{2t^2 \hat{i}} + \underline{5t \hat{j}} + \underline{(t-s) \hat{k}}$$

$$\vec{v} = 4t \hat{i} + 5 \hat{j} + 1 \hat{k}$$

$$\left\{ \begin{array}{l} t_0 = 0 \\ \vec{r}_0 = -s \hat{k} \end{array} \right\}$$

$\left\{ \begin{array}{l} x_0 = 0 \\ y_0 = 0 \\ z_0 = -s \end{array} \right\}$

$$\vec{r}(t) = ?$$

$$\vec{v} = \frac{d\vec{r}}{dt} \Rightarrow \left\{ \begin{array}{l} \frac{dx}{dt} = 4t \\ \frac{dy}{dt} = 5 \\ \frac{dz}{dt} = 1 \end{array} \right\} \Rightarrow$$

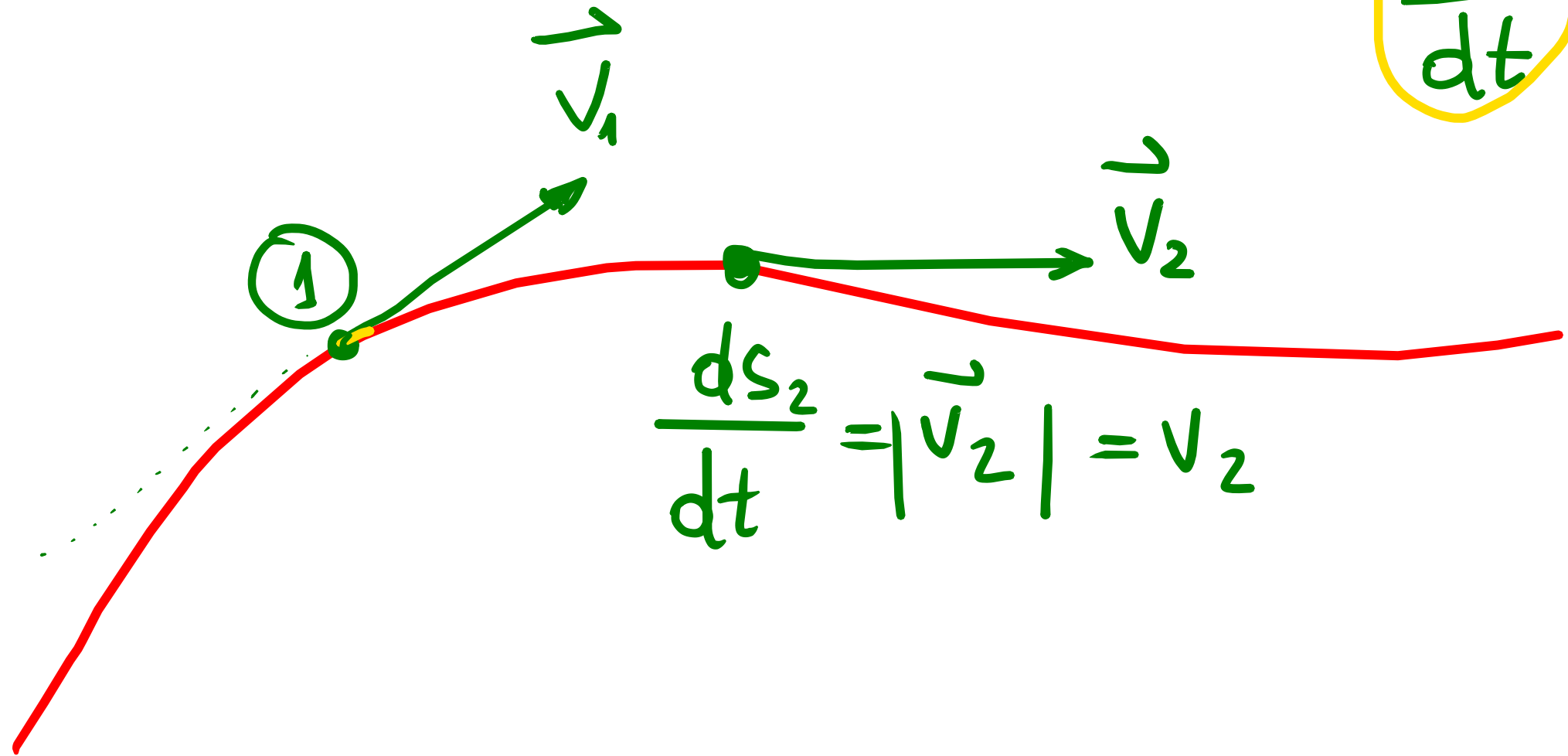
$\frac{dx}{dt} = 4t$
 $\Rightarrow \int dx = \int 4t dt$
 $\Rightarrow x = 2t^2 + C_1$

$$x = 2t^2 + C_x \rightarrow 0$$

$$y = 5t + C_y \rightarrow 0$$

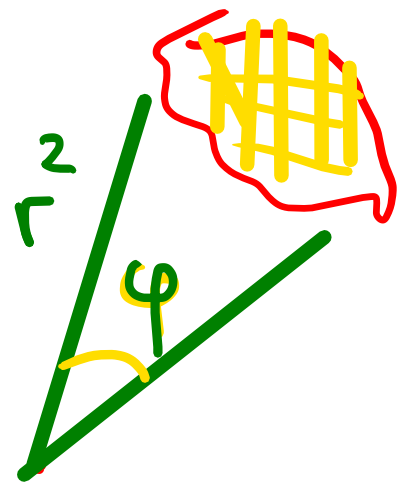
$$z = t + C_z \rightarrow -s$$

$$|\vec{v}_1| = \frac{ds_1}{dt}$$



$$\frac{ds_2}{dt} = |\vec{v}_2| = v_2$$

Χώρο



φ rad

$$\varphi = \frac{s}{r^2}$$

$$\varphi_{6\varphi} = \frac{4\pi r^2}{r^2} = 4\pi$$

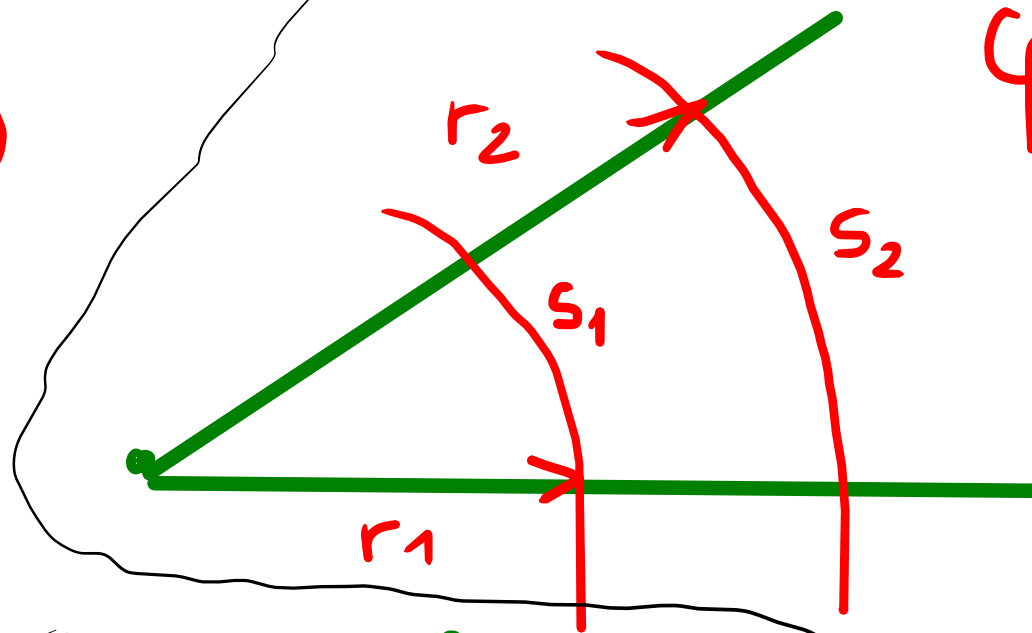
$$\varphi_0 = \frac{2\pi r}{r} = 2\pi$$

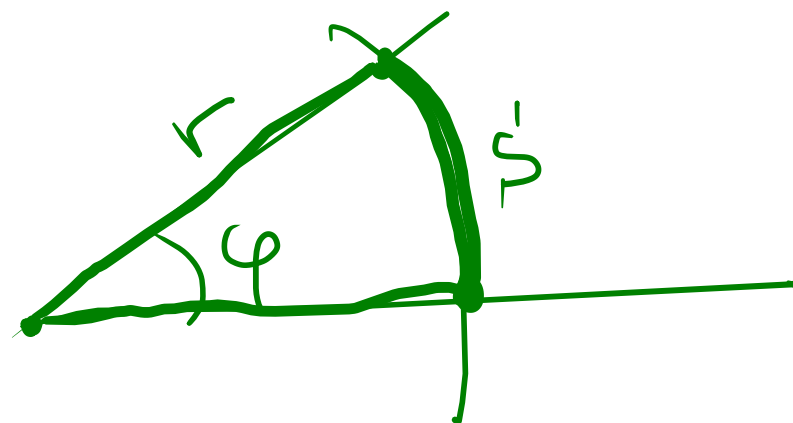
Επίτηδο

$$\varphi = \frac{s_1}{r_1} = \frac{s_2}{r_2} = \dots$$

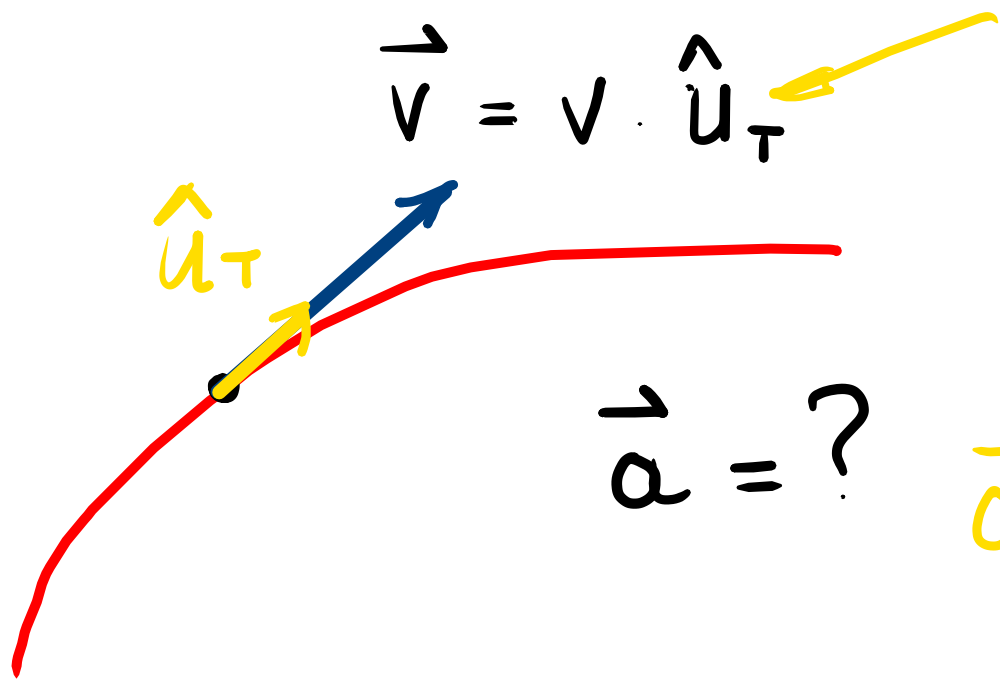
φ [rad]

2π rad κύκλος





$$\varphi = \frac{s}{r}$$



$$\vec{a} = ?$$

$$\vec{a} = \frac{d\vec{v}}{dt} = \frac{d}{dt} (v \cdot \hat{u}_\tau) =$$

$$= \left(\frac{dv}{dt} \right) \hat{u}_\tau + v \frac{d\hat{u}_\tau}{dt}$$

$$= \underbrace{\left(a_\tau \right) \hat{u}_\tau}_{\uparrow} + \underbrace{v \frac{d\hat{u}_\tau}{dt}}_{\text{red circle}}$$

$$a_\tau = \frac{dv}{dt} = \frac{d}{dt} \left(\frac{ds}{dt} \right)$$

$$v = 3x^2 \Rightarrow$$

$$\frac{dx}{dt}$$

$$= 3x^2$$

$$\Rightarrow dt = \frac{dx}{3x^2}$$

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

?

< t

$$\underline{x = \sin t + t} \Rightarrow \underline{t = t(x)} ?$$

