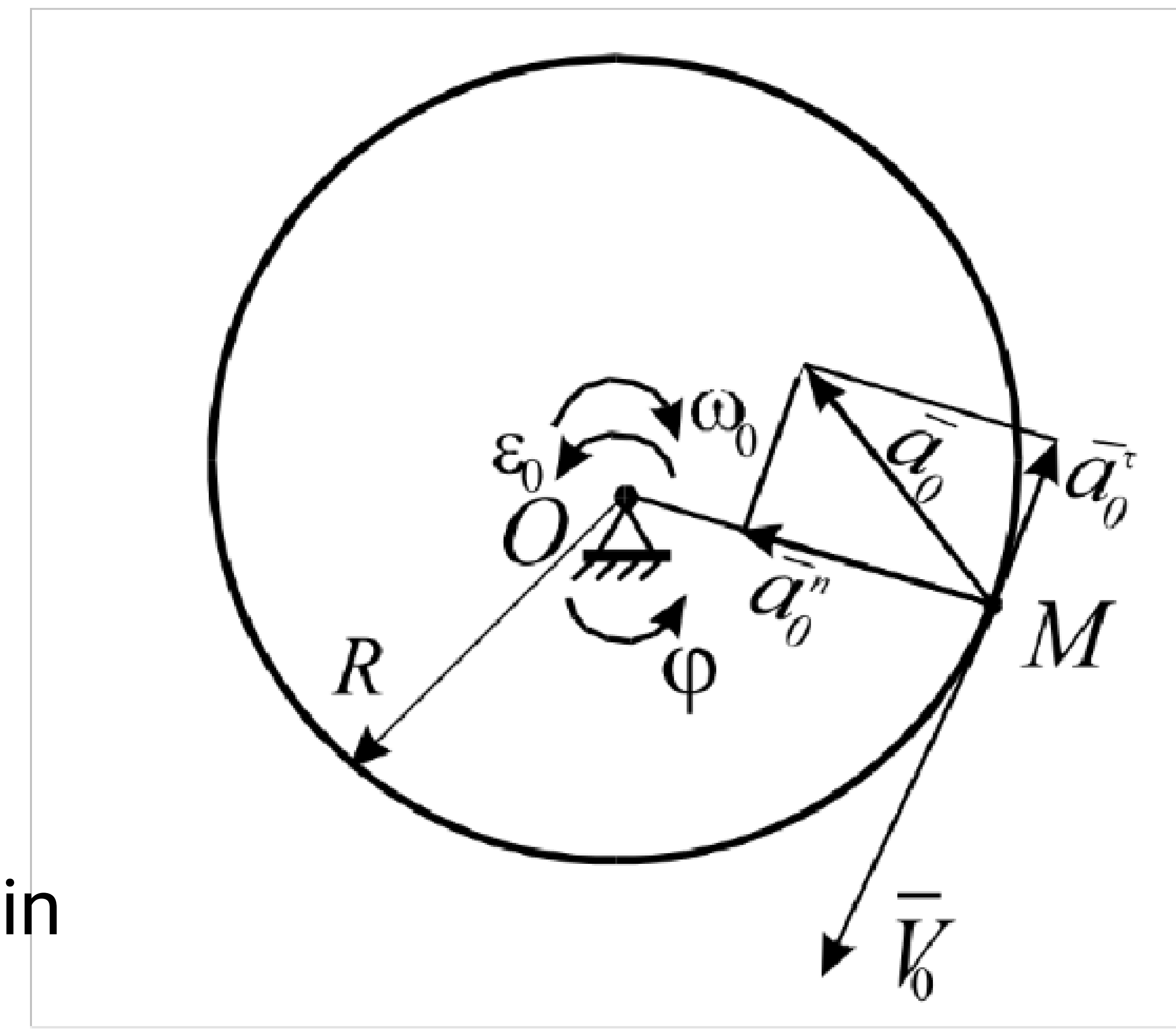
Disk $R = 2$ rotates around O. Its motions is $\phi = \phi(t) = 2e^{-2t}$. It is needed to find angular velocity and acc for the body. Also, you need to find M velocity and acc, for $t = 0$.



Lab 2, task 2

TIPS:
1) Positive angle direction is counter clockwise in our course!
2) Velocity/Acceleration contains 2 components: magnitude and direction. Most of the time you should find both.
3) Because of (2), you have to draw a vector direction on a figure (it's already done right now, but the explanation will be further on.

1) We need to find angular velocity and angular acceleration.

We have $\varphi(t) \rightarrow$

$$\left.\begin{aligned} \omega &= \dot{\varphi} \\ \varepsilon &= \ddot{\varphi} = \dot{\omega} \end{aligned}\right\} \Rightarrow \begin{aligned} &\omega = -4e^{-2t} \ 1/сек \\ &\varepsilon = 8e^{-2t} \ 1/сек^2 \end{aligned}$$

Put t=0
(We need this info for putting a correct drawing)
$$\Rightarrow \begin{aligned} \omega_0 &= -4 \\ \varepsilon_0 &= 8 \end{aligned}$$

2) For finding "M" velocity and acceleration we need to remember a correlation between angular and linear components (lab 2 on cheat sheet slides)

$V_0 = \omega_0 R = -4 \cdot 2 = 8 \ m/s$

$a_{\tau_0} = \varepsilon_0 R = 8 \cdot 2 = 16 \ m/s$

$a_{n_0} = \omega_0^2 R = 32$

$\bar{a}_0 = \bar{a}_{\tau_0} + \bar{a}_{n_0}$

3) Drawing:
a) $\bar{V}_0$ should be tangent to circle, the same direction as ω
b) $\bar{a}_\tau$ should be opposite to $\bar{V}$ $(V_0 < 0, a_\tau > 0)$

c) $\bar{a}_n$ direct to "O" point