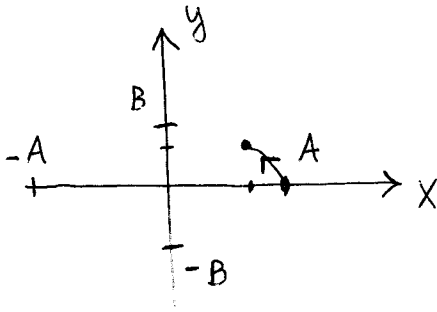


20.)

$$x(t) = A \cos \omega t \quad y(t) = B \sin \omega t$$

$$t_0 = 0 \quad t_1 = \frac{\pi}{4\omega}$$

$$W = ?$$



$$\omega = \frac{2\pi}{T}$$

$$W = \int_0^t \vec{F} \cdot \vec{v} dt = \int_{\vec{r}_0}^{\vec{r}_1} \vec{F} \cdot d\vec{r}$$

$$\vec{F} = -\nabla V$$

$$\frac{d\vec{r}}{dt} = \vec{v}$$

A módszer:

$$v_x(t) = -A\omega \sin \omega t$$

$$v_y(t) = B\omega \cos \omega t$$

$$\cos \omega \frac{\pi}{4\omega} = \cos \frac{\pi}{4} = \frac{1}{\sqrt{2}}$$

$$\sin \frac{\pi}{4} = \frac{1}{\sqrt{2}}$$

$$F_x(t) = m a_x(t) = -A\omega^2 m \cos \omega t$$

$$F_y(t) = -B\omega^2 m \sin \omega t$$

$$W = \int_0^{\pi/4\omega} \vec{F} \cdot \vec{v} dt = \int_0^{\pi/4\omega} (A^2 \omega^3 m \sin \omega t \cos \omega t - B^2 \omega^3 m \sin \omega t \cos \omega t) dt =$$

$$= m\omega^3 (A^2 - B^2) \int_0^{\pi/4\omega} \sin \omega t \cos \omega t dt = \frac{m\omega^2 (A^2 - B^2)}{2} \left[\sin^2 \omega t \right]_0^{\pi/4\omega} =$$

B módszer:

$$F_x = -\omega^2 m x \quad F_y = -\omega^2 m y \rightarrow \vec{F} = -\omega^2 m \vec{r} = -\nabla V$$

$$V = \frac{1}{2} \omega^2 m r^2 = \frac{1}{2} m \omega^2 (x^2 + y^2)$$

$$W = -\Delta V = -(V_2 - V_1) = V_1 - V_2 =$$