

Mekanik II M2, 5C1140

Hand in assignment 1, HT 2004

A three-particle system consists of particles with masses $m_1 = 3m$, $m_2 = m$, and $m_3 = 5m$. Their position vectors have Cartesian components $\mathbf{r}_1(t) = a[t/\tau, -2, 3(t/\tau)^2]$, $\mathbf{r}_2(t) = a[(t/\tau) - 1, (t/\tau)^3, 5]$, and $\mathbf{r}_3(t) = a[2 - (t/\tau)^2, t/\tau, (t/\tau)^3]$ respectively. Here a is constant of dimension length and τ is a constant of dimension time.

Calculate

- a) the center of mass of the system at time $t = 0$
- b) the center of mass of the system at time $t = \tau$
- c) the total momentum of the system at time $t = 0$
- d) the total force $\mathbf{F}(t)$ acting on the system, as function of time
- e) the total angular momentum with respect to the origin at time $t = 0$
- f) the total moment (of force) with respect to the origin as function of time.

The solutions, which must have explanative *text* in English, are intended to start from general laws and definitions. All essential steps in the calculations must be included.

Mark the solutions with your *name* and number as well as *my name* (Hanno Essén). They must be *tidy* and easy to read, as well as correct.

The last day for handing in this assignment is Friday, September 10.