2. The time-dependent positions (in meters) of three particles with masses $m_1=1$kg, $m_2=2$kg, and $m_3=3$kg are:

$$\mathbf{r}_1(t) = \left[(3+2t^2)\hat{\mathbf{i}} + 4\hat{\mathbf{j}}\right],$$

$$\mathbf{r}_2(t) = \left[(-2+1/t)\hat{\mathbf{i}} + 2t\hat{\mathbf{j}}\right],$$

$$\mathbf{r}_3(t) = \left[\hat{\mathbf{i}} - 3t^2\hat{\mathbf{j}}\right].$$

Find
(a) The total kinetic energy of the system.
(b) The rotational kinetic energy.
(c) The total angular momentum of the system.
(d) The angular momentum of spin of the system.
(e) The total torque acting on the system.