Assignment 8: Due March 18, 2010.

**Problem 1.** Prove that the double integral that shows up in the expression of the virtual work is zero.

**Problem 2.** Prove that $\dot{\omega} = 2G\ddot{\rho}$. Hint: start with $\ddot{\omega} = 2G\dot{\rho}$, take a time derivative and show that $\dot{\ddot{\rho}} = 0$. This last step is brute force.

**Problem 3.** This problem builds on Problem 2 of Assignment 7. The schematic of the mechanism is shown in the figure. The rigid body is subjected to a motion specified as $\theta(t) = \frac{\pi}{4} \sin(2t)$.

You will have to carry out a Kinematics Analysis for the mechanism for 10 seconds of its evolution. To this end, use a time grid with time steps of $\Delta t = 10^{-3}$. In the folder solution, include a movie of the time evolution of this mechanism, along with six plots. The first three will display the location of point $O'$ in the G-RF as a function of time, the second one its velocity in the G-RF as a function of time, and the third one will display its acceleration in the G-RF. The last set of three plots will display to same information for the tip of the pendulum located at $Q$. When you return the handwritten component of this homework please include an explanation of the results that you obtain for point $Q$.

NOTE: USE THE $\omega$ APPROACH TO FORMULATE THE VELOCITY AND ACCELERATION PROBLEMS.