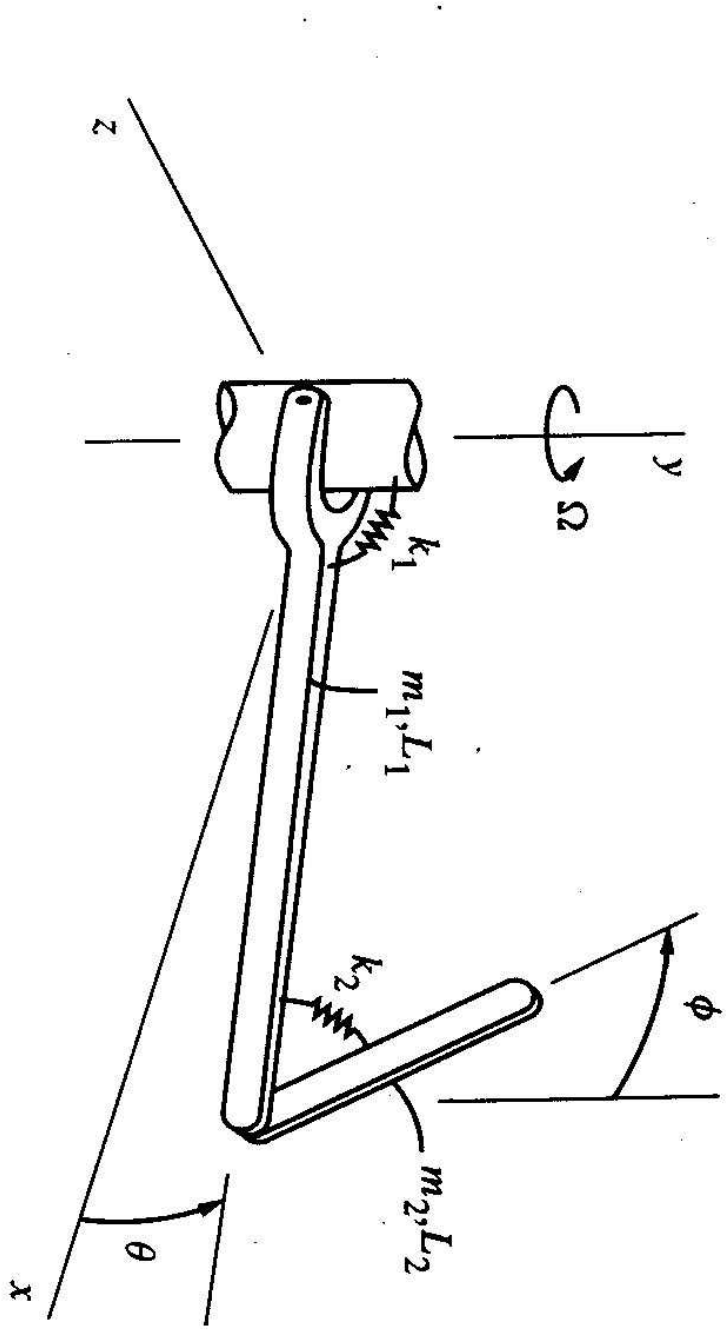
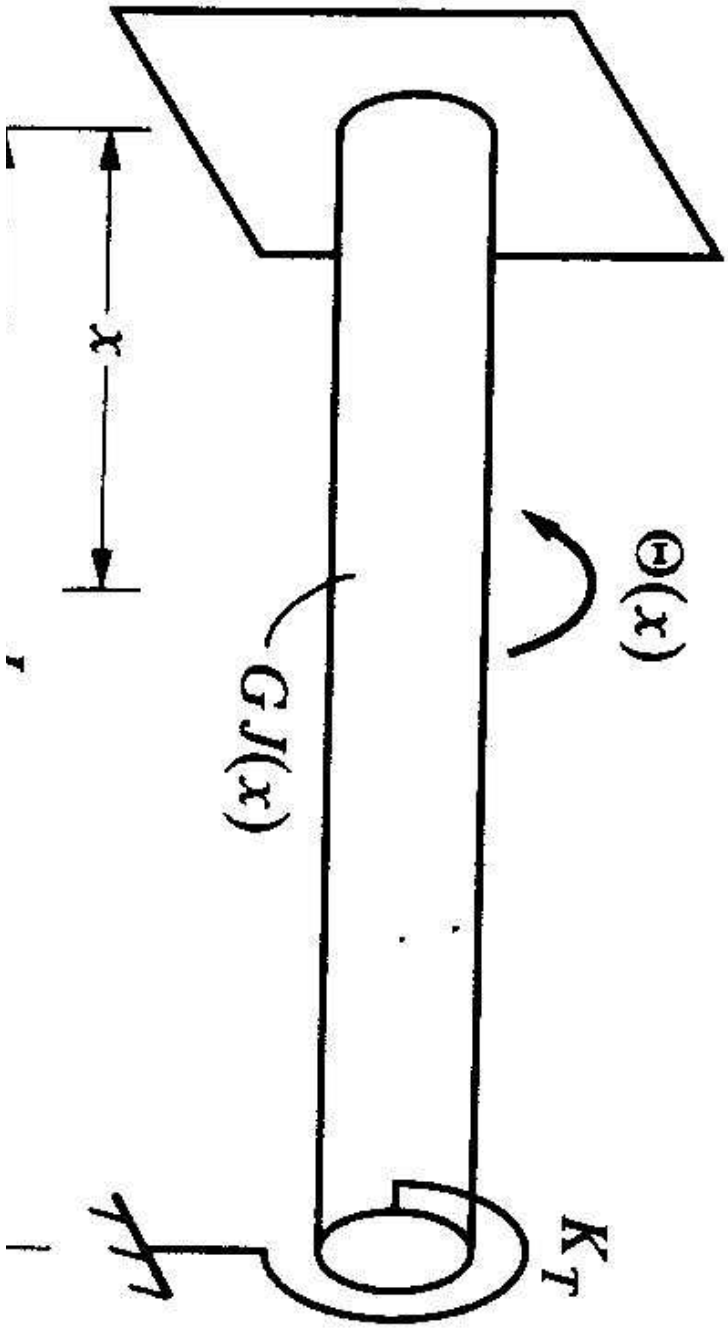
Computational Methods in Structural Dynamics, Exam 1 Winter 2000

One 8.5" by 11" cheat sheet.

1. The system below consists of two rigid links of total mass m_i and length L_i (i = I, 2,) hinged to a shaft rotating with the constant angular velocity Ω about a vertical axis. The links are hinged so as to permit motion of the links in the rotating vertical plane and their angular displacements θ and ϕ are restrained by torsional springs of stiffness kl and k2, respectively. Derive the equations of motion for arbitrarily large angles θ and ϕ.



2. Find the mode shapes and natural frequencies. You do not need to solve the characteristic equation for the eigenvalues, but you should sketch the solution graph.


x
GJ(x)
Θ(x)
K_T