

## Homework for Lecture 9

### Problem 9.1

Problem 3.53 in Rao

### Problem 9.2

When a large turbine generator having a mass of 2500 kg is installed on its suspension system it is observed to deflect the suspension system by 5 mm. When the system is brought to its operating speed of 3600 rpm (376.99 rad/s) the housing is observed to have a peak-to-peak oscillation amplitude of 8 mm. In an effort to determine the magnitude of the unbalance (the unbalance is defined to be the unbalanced mass,  $m$ , times the eccentricity,  $e$ , that is  $me$ ), the system is later run at resonance (assume  $r = 1$ ), and the resulting peak to peak oscillation amplitude is 10 mm. Assume that the suspension system is composed of linear springs and viscous dampers. Determine

- a) the magnitude of the unbalance,  $me$ , in kg-m
- b) the damping ratio for this system

How does your answer change if you assume the 10 mm is the maximum peak to peak amplitude?

Note: If you use Maple, be sure to include a printout of your worksheet.