SD 553: Advanced Dynamics **Assignment 4**

Prof. J. McPhee **Due: 20 November 2015**

Instructions: *On all five assignments this term, there will be 4-5 problems — three of which will be graded to determine your assignment mark for the term. Marks will be deducted for assignment problems not attempted. Be neat and organized in your solutions, and be sure to include units, directions, and 3 significant figures in your final answer.*

1. Problem 5.9 from Ginsberg's text (p.231). Start with an XYZ axis such that X is parallel to the 600-mm side, and Y is parallel to the 300-mm side.

Optional Check: Applying Matlab or Maple to your result, verify (or disprove) Ginsberg's solution for the principal moments of inertia in Problem 5.10.

2. Problem 5-17 from Ginsberg's text (p.234). Express your results in global XYZ components, where Z is vertical upwards, and X is out of the page. Assume that there are no reaction moments, just reaction forces, and note that the weight is neglected when calculating "dynamic reactions".

3. Problem 5-27 from Ginsberg's text (p.236). Let the cone have radius R and length L, i.e., $\tan\beta = R/L$. Let the cone axis of symmetry be x, with both x and y lying in a vertical plane.

4. Problem 5-41 from Ginsberg's text (p.240). Use a local xyz frame, with $\hat{\jmath} = \hat{e}_{B/A}$ and $\hat{\imath}$ out of the page at the instant shown.

Optional Check: Derive the differential equations for $\ddot{\theta}$ and $\dot{\Omega}$, and numerically integrate these equations using Matlab (or Maple) to verify your solution for θ_{max}.