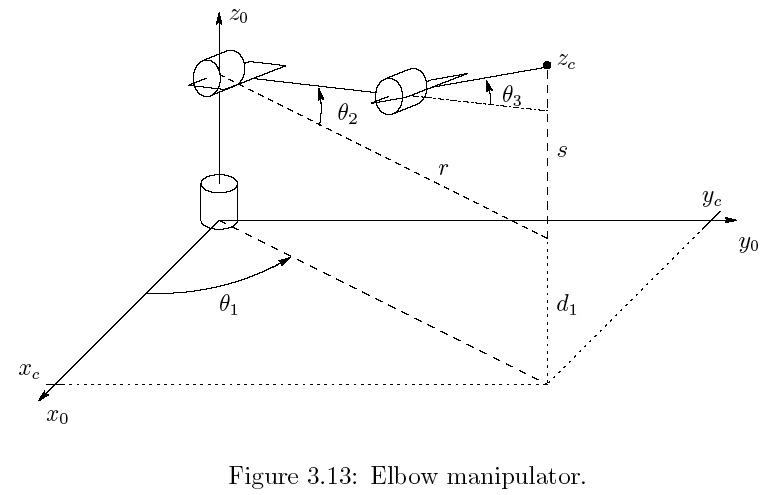


**ECE 5397/6397: Intro to Robotics**

**HW 4, Due March 4** The manipulator Jacobian

1. Calculate the manipulator Jacobian of the anthropomorphic manipulator at the position *zc.*
   1. Write out the J matrix in terms of zi and oi.
   2. Write out the J values. Calculate the cross products. You may use your previous calculations for the A and T matrices.



1. Calculate the manipulator Jacobian of the cylindrical robot with spherical wrist manipulator at the position *z6.*
   1. Write out the J matrix in terms of zi and oi.
   2. Write out the J values. Calculate the cross products. You may use your previous calculations for the A and T matrices.

