

MECH564

Final Exam Review Topics

1. Homogeneous transformation matrix
 - a. ortho-normal properties
 - b. interpretation of columns (frame unit vectors and origin position vector)
 - c. transformation equation interpretation (post: local; pre: global)
 - d. frame diagram interpretation
 - i. write transformation equations from frame diagram
 - ii. draw frame diagram from transformation equation
2. Manipulator workspace
 - a. sweep method or critical point method
3. Forward position analysis
 - a. frame assignment
 - b. DH parameters
 - c. link parameter table
 - d. task space coordinates in terms of joint values
4. Forward kinematics
 - a. Jacobian
 - b. task space speeds in terms of joint speeds
5. Inverse kinematics
 - a. inverse Jacobian
 - b. singularity positions
6. Adept vision transformations
 - a. to.cam[1], part.grip
 - b. frame diagram interpretation
 - c. transformation equations
7. Redundant manipulator basics
 - a. sizes of joint space, task space, Jacobian, etc.
 - b. Moore-Penrose generalized inverse
 - c. general solution to inverse kinematics
 - d. null space projection operator
8. Image processing basic
 - a. binary image position and orientation
 - b. histogram
 - c. contrast enhancement
9. Basic questions from class presentations (to reward attendance)?