06. Kinematics, inverse kinematics, Programming of a simulated robotic arm

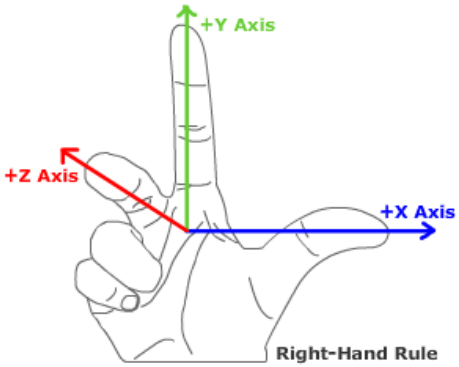
Warning

Test 2 on **December 8.**

Rehearsal

3D transformations

- **Position:** 3 element offset vector



- **Orientation:** 3 x 3 rotation matrix
  - additional orientation representations: Euler angles, RPY, angle axis, quaternion
- **Pose:** 4 × 4 transformation matrix
- **Coordinate frame:** origin, 3 axis, 3 base vector, right-hand rule
- **Homogeneous transformations:** rotation and translation together
  - e.g. $\mathbf{R}$ for rotation and $\mathbf{v}$ for translation: