

**Homework # 1**

Due: January 29, 2007

1. Derive the relationship between a rotation matrix  $R$  (i.e.,  $R \in SO(3)$ ) and the following representations (in both directions). If there are multiple solutions, find all of them.
  - (a) Equivalent axis/angle  $(k, q)$
  - (b) Unit quaternion (or Euler Parameters),  $(q_o, q)$
  - (c) Vector quaternion,  $q$
  - (d) Gibb's vector (or Euler-Rodrigues Parameters),  $b$
  - (e) Euler angles (3-2-1, or roll-pitch-yaw)
2. Find at least one other representation mentioned in the literature.