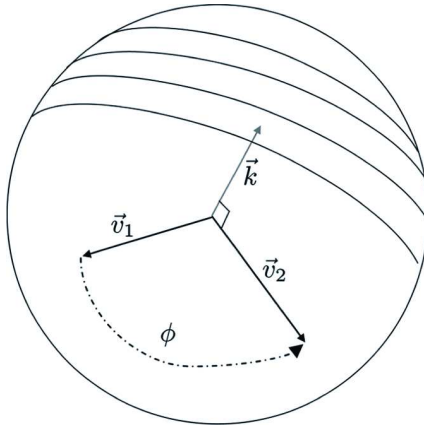


Question Set 7

CS 320

Chapter 8

1. Consider the following figure:



The vectors \vec{v}_1 and \vec{v}_2 extend from the center of the arcball to points on the surface of the sphere represented by the arcball. Let the points be \tilde{p}_1 and \tilde{p}_2 respectively. Let the center of the arcball be \tilde{c} . Starting from these three points, write pseudo-code to construct:

- (a) \vec{k} . Also, what does \vec{k} represent?
 - (b) The angle ϕ .
 - (c) The quaternion representing the rotation from \vec{v}_1 to \vec{v}_2 .
2. Referring to the previous figure, the arcball interface uses the quaternion $[\cos \phi, \sin \phi \hat{\mathbf{k}}]^t$ to represent the rotation from \vec{v}_1 to \vec{v}_2 . This causes the rotated object to rotate twice as far as expected. Why?
 3. For the arcball interface, given two raw mouse click points $[x_1, y_1]^t$ and $[x_2, y_2]^t$, write pseudo-code to convert them to the vectors \vec{v}_1 and \vec{v}_2 . Assume that you have the arcball's `RigTform`. You will need to use the `getScreenSpaceCoord()` function described in the *Implementing an Arcball Interface* reading.
 4. Given the vectors \vec{v}_1 and \vec{v}_2 , write pseudo-code to construct the `RigTform` corresponding to the rotation between them.