Congratulations! You passed!

Grade received 100% To pass 80% or higher

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1. The orientation of a frame {d} relative to a frame {c} can be represented by a unit rotation axis $\hat{\omega}$ and the distance θ rotated about the axis. If we rotate the frame {c} by θ about the axis $\hat{\omega}$ expressed in the {c} frame, we end up at {d}. The vector $\hat{\omega}$ has 3 numbers and θ is 1 number, but we only need 3 numbers, the exponential coordinates $\hat{\omega}\theta$, to represent {d} relative to {c}, because

1 / 1 point

- (●) though we use 3 numbers to represent $\hat{\omega}$, $\hat{\omega}$ actually only represents a point in a 2-dimensional space, the 2-dimensional sphere of unit 3-vectors.
- ( ) the choice of θ is not independent of $\hat{\omega}$.

Correct

2. One reason we use 3x3 rotation matrices (an implicit representation) to represent orientation is because it is a good global representation: there is a unique orientation for each rotation matrix, and vice-versa, and there are no singularities in the representation. In what way does the 3-vector of exponential coordinates fail these conditions? Select all that apply.

1 / 1 point

- [x] There could be more than one set of exponential coordinates representing the same orientation.

Correct
If $\hat{\omega}\theta$ is a representation of the orientation, then we could change θ by any integral multiple of 2π and get a different set of exponential coordinates representing the same orientation. If we restrict the exponential coordinate vector to have a magnitude of π or less (a solid sphere in 3-space), then

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