Congratulations! You passed!

Grade received 100% To pass 80% or higher

Go to next item

1. Which of the following is equivalent to R_{ac}, the representation of the orientation of the {c} frame relative to the {a} frame? Select all that apply. 1 / 1 point

- [x] $R_{ab}R_{bc}$

  Correct
  This is correct by the subscript cancellation rule.

- [x] $R_{ab}R_{ba}^{\top}$

  Correct
  $R_{ba}^{\top}$ is the inverse of R_{ab} which is equivalent to R_{bc}, so this is correct by the subscript cancellation rule.

- [x] $(R_{bc}^{\top}R_{ab}^{\top})^{\top}$

  Correct
  Use the facts that $R_{ab}^{\top} = R_{ba}$ and $(R_1R_2)^{\top} = R_2^{\top}R_1^{\top}$.

- [x] $R_{ad}R_{db}R_{bc}$

  Correct
  This is correct by the subscript cancellation rule.

2. The matrix 1 / 1 point

$$R = \mathrm{Rot}(\hat{x}, 90^{\circ}) = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & 1 & 0 \end{bmatrix}$$

represents the orientation R_{ab} of a frame {a} that has been achieved by rotating the {a} frame by 90 degrees about its $\hat{x}$-axis. Now, given a matrix R_{cb} representing the orientation of {b} relative to {a}, which of the following represents the orientation of a frame (relative to {a}) that was initially aligned with {b}, but then rotated about the {b}-frame's $\hat{x}$-axis by 90 degrees?

- (•) $R_{cb}R$
- ( ) RR_{cb}

  Correct
  R_{cb} should be viewed as a representation of an orientation and R should be viewed as a rotation operator. Performing the operation on the right means the operation is done in terms of the axes of the frame of the second subscript, {b}.

3. The matrix 1 / 1 point

$$R = \mathrm{Rot}(\hat{x}, 90^{\circ}) = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & 1 & 0 \end{bmatrix}$$

represents the orientation R_{ab} of a frame {a} that has been achieved by rotating the {a} frame by 90 degrees about its $\hat{x}$-axis. Now, given a matrix R_{cb} representing the orientation of {b} relative to {a}, which of the following represents the orientation of a frame (relative to {a}) that was initially aligned with {b}, but then rotated about the {a}-frame's $\hat{x}$-axis by 90 degrees?

- ( ) $R_{cb}R$
- (•) RR_{cb}

  Correct
  R_{cb} should be viewed as a representation of an orientation and R should be viewed as a rotation operator. Performing the operation on the left means the operation is done in terms of the axes of the frame of the first subscript, {a}.