✓ **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

☑ $R_{ab}R_{bc}$

✓ **Correct**
This is correct by the subscript cancellation rule.

☑ $R_{ab}R_{cb}^{\mathrm{T}}$

✓ **Correct**
R_{cb}^{T} is the inverse of R_{cb} which is equivalent to R_{bc}, so this is correct by the subscript cancellation rule.

☑ $(R_{bc}^{\mathrm{T}}R_{ab}^{\mathrm{T}})^{\mathrm{T}}$

✓ **Correct**
Use the facts that $R_{ab}^{\mathrm{T}} = R_{ba}$ and $(R_1 R_2)^{\mathrm{T}} = R_2^{\mathrm{T}} R_1^{\mathrm{T}}$.

☑ $R_{ad}R_{db}R_{bc}$

✓ **Correct**
This is correct by the subscript cancellation rule.

---

2. The matrix

1 / 1 point

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

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

⦿ $R_{sb}R$

○ RR_{sb}

✓ **Correct**
R_{sb} 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

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

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

○ $R_{sb}R$

⦿ RR_{sb}

✓ **Correct**
R_{sb} 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, {s}.