Rotations and Translations

7 questions

1 point

1.

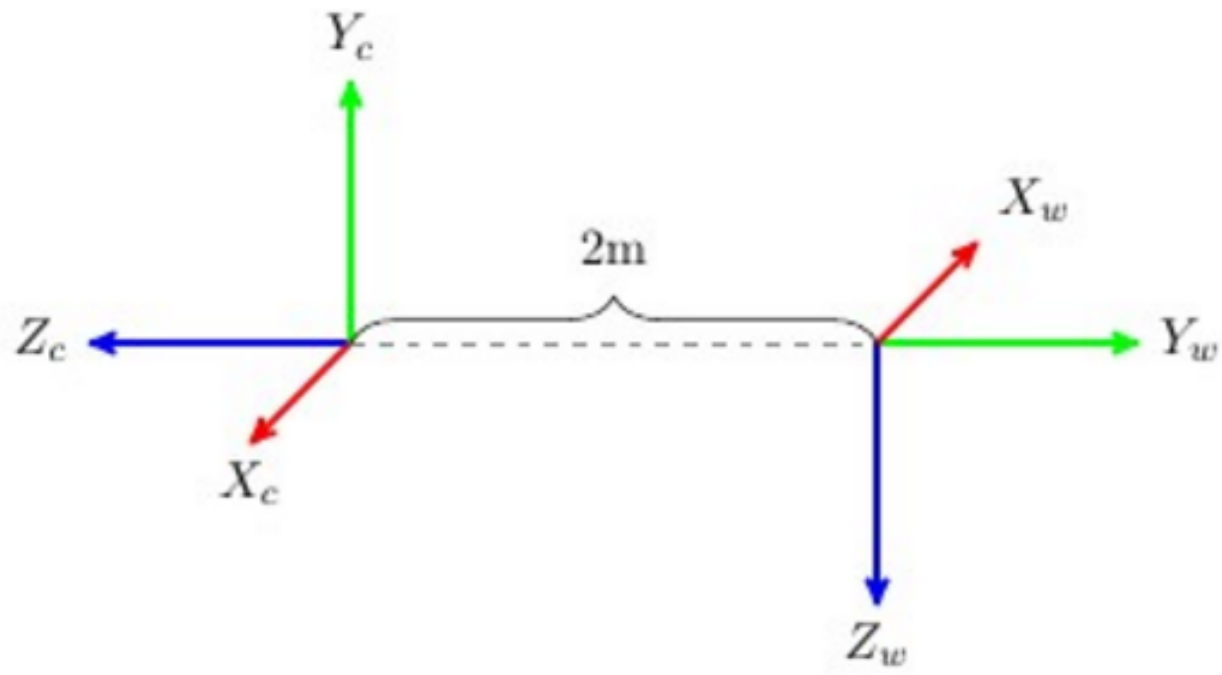
What is the determinant of a rotation matrix?

- -1
- -1, 0 or 1
- -1 or +1
- +1

1 point

2.

What is the rotation ${}^{c}R_{w}$ such that $\mathbf{X}_{c} = {}^{c}R_{w}\mathbf{X}_{w} + {}^{c}T_{w}$ for a point $\mathbf{X}_{w}$ expressed in the world coordinate frame?



- ${}^{c}R_{w} = \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$
- ${}^{c}R_{w} = \begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & -1 & 0 \end{pmatrix}$
- ${}^{c}R_{w} = \begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$
- ${}^{c}R_{w} = \begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$

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1 point

3.

What is the corresponding translation ${}^{c}T_{w}$?

- ${}^{c}T_{w} = (2, 0, 0)$
- ${}^{c}T_{w} = (0, 2, 0)$
- ${}^{c}T_{w} = (0, 0, 2)$

- ${}^{c}T_{w} = (0, 0, -2)$
- ${}^{c}T_{w} = (-2, 0, 0)$

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1 point

4.
What is ${}^{w}R_{c}$?

- ${}^{w}R_{c} = \begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & -1 & 0 \end{pmatrix}$
- ${}^{w}R_{c} = \begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$
- ${}^{w}R_{c} = \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$
- ${}^{w}R_{c} = \begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$

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1 point

5.
What is ${}^{w}T_{c}$?

- ${}^{w}T_{c} = (0, 2, 0)$
- ${}^{w}T_{c} = (0, 0, -2)$
- ${}^{w}T_{c} = (0, 0, 2)$
- ${}^{w}T_{c} = (0, -2, 0)$

1

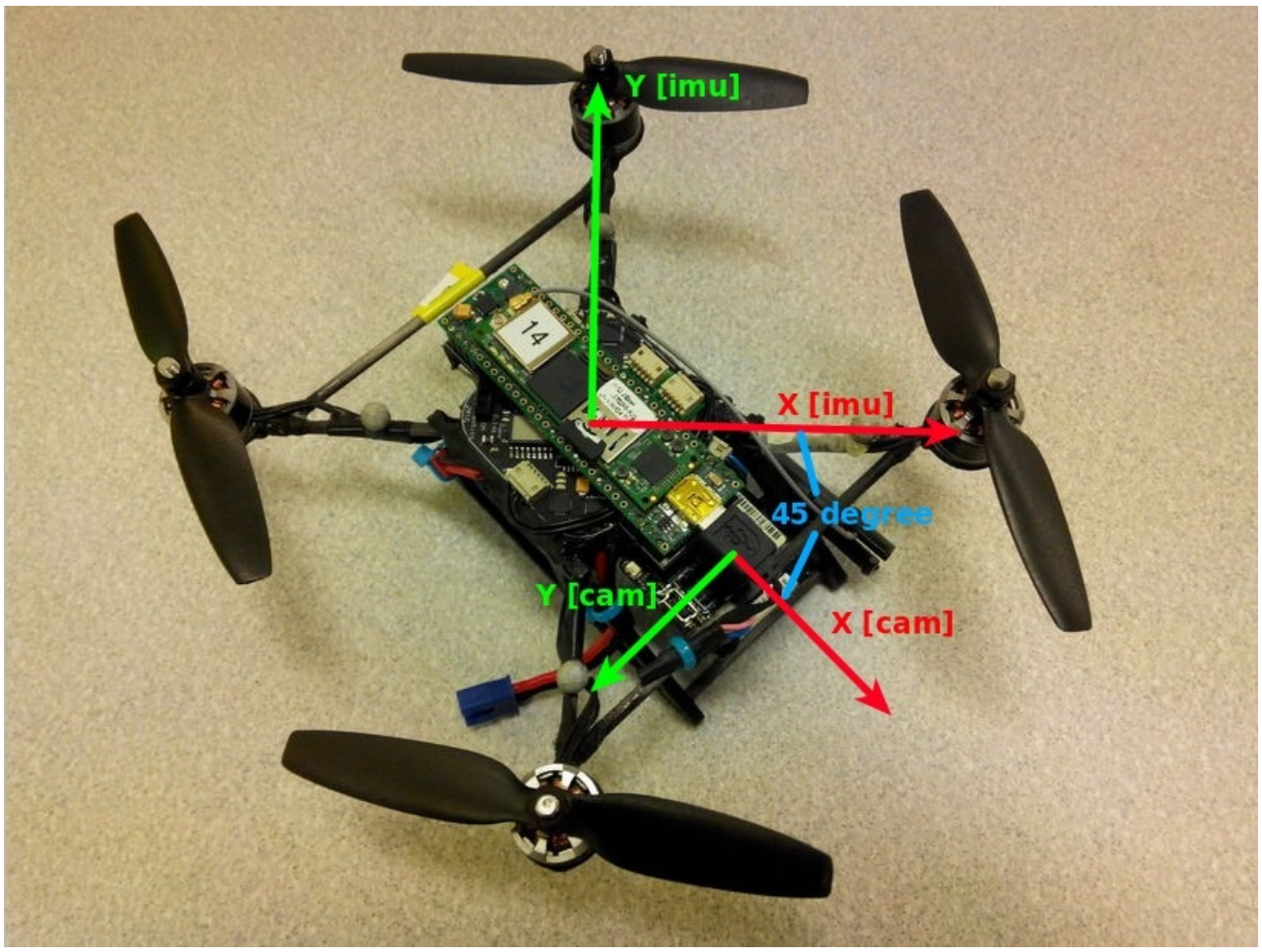
point

6.

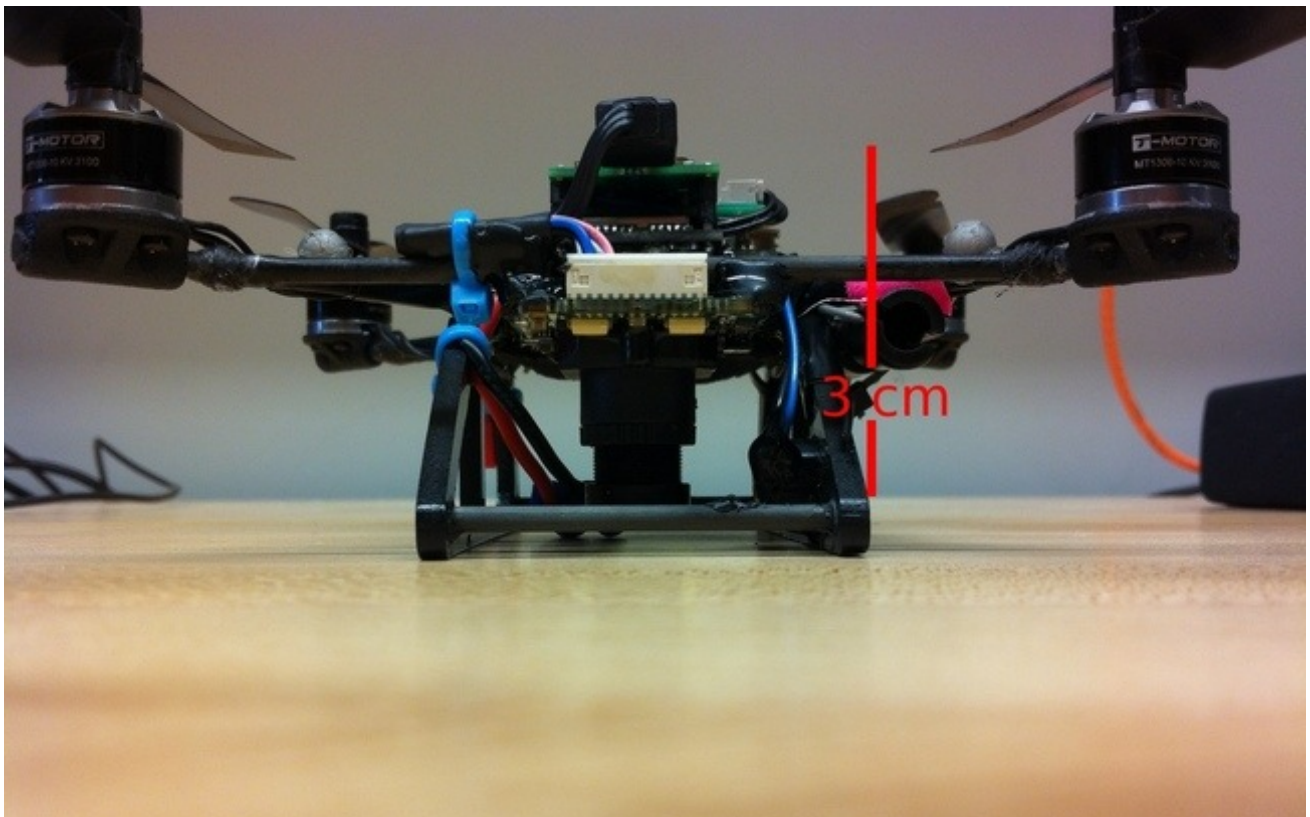
For the quadrotor configuration in the two images below (top view and side view), what is the transformation from the body (imu) coordinate system to the camera?

In particular, what is the rotation ${}^{c}R_{b}$ such that $\mathbf{X}_{c} = {}^{c}R_{b}\mathbf{X}_{b} + {}^{c}T_{b}$ for a point $\mathbf{X}_{b}$ expressed in the body coordinate frame?

[Top View]



[Side View]



- $^{c}R_{b} = \begin{pmatrix} \frac{\sqrt{2}}{2} & 0 & -\frac{\sqrt{2}}{2} \\ 0 & -1 & 0 \\ -\frac{\sqrt{2}}{2} & 0 & \frac{\sqrt{2}}{2} \end{pmatrix}$

- $^{c}R_{b} = \begin{pmatrix} \frac{\sqrt{2}}{2} & -\frac{\sqrt{2}}{2} & 0 \\ -\frac{\sqrt{2}}{2} & -\frac{\sqrt{2}}{2} & 0 \\ 0 & 0 & -1 \end{pmatrix}$

- $^{c}R_{b} = \begin{pmatrix} \frac{\sqrt{2}}{2} & -\frac{\sqrt{2}}{2} & 0 \\ 0 & 0 & -1 \\ -\frac{\sqrt{2}}{2} & -\frac{\sqrt{2}}{2} & 0 \end{pmatrix}$

- $^{c}R_{b} = \begin{pmatrix} \frac{\sqrt{2}}{2} & 0 & -\frac{\sqrt{2}}{2} \\ 0 & -1 & 0 \\ -\frac{\sqrt{2}}{2} & 0 & -\frac{\sqrt{2}}{2} \end{pmatrix}$

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1 point

7.

What is the corresponding translation $^{c}T_{b}$?

- $^{c}T_{b} = (0.04, 0, 0.03)\text{m}$
- $^{c}T_{b} = (-0.03, 0, -0.04)\text{m}$
- $^{c}T_{b} = (-0.04, 0, -0.03)\text{m}$
- $^{c}T_{b} = (0.03, 0, 0.04)\text{m}$

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7 questions unanswered

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