## Congratulations! You passed!

Grade received 100% **Latest Submission** Grade 100%

To pass 75% or higher

Go to next item

1/1 point

1.	Which of	fthese	statements	are	true?	Select	any/all	that app	oly
1.	wnich of	tnese	statements	are	true?	Select	any/all	tnat app	οιy

Every 3x3 matrix represents a 3D rotation.

Every unit quaternion has an associated 3x3 rotation matrix.

Correct Correct! Every quaternion corresponds to a 3x3 rotation matrix.

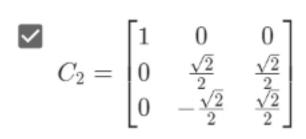
Every set of Euler angles corresponds to a unit quaternion.

## Correct

Correct! Any set of Euler angles represents a rotation which can also be represented by a unit quaternion.

## 2. Which of these are valid rotation matrices? Select any/all that apply:

2/2 points



Correct!  $C_2C_2^T=\mathbf{I}$  holds and  $\det C_2=1$ .

 $C_1 = egin{bmatrix} 1 & 0 & 0 \ 0 & 1 & 0 \ 0 & 0 & 1 \end{bmatrix}$ 

**⊘** Correct

Correct! Since  $C_1$  is an identity matrix, it is equivalent to performing "zero" rotation.

$$C_4 = egin{bmatrix} 0 & 0 & 1 \ 0 & 1 & 1 \ 1 & 0 & 0 \end{bmatrix}$$

$$C_3 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} \\ 0 & \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} \end{bmatrix}$$

3. Localization can be performed on board a vehicle by integrating the rotational velocities and linear accelerations measured by an IMU. Assuming that the IMU measurement noise is drawn from a normal distribution, what will the pose estimation error look like?

1/1 point

- The vehicle pose estimation error will grow with time.
- The vehicle pose estimate error will remain within a bounded interval.
- The vehicle pose estimate error will decrease with time.

**⊘** Correct

Correct! Since we are integrating noisy measurements, the error will build up over time.

4. Each GPS satellite transmits a signal that encodes:

1/1 point

- The satellite's position and time of signal transmission.
- The receiver's position and time of signal transmission

Correct

Correct! This information can be used to calculate the vehicle's position.

5. Which of these systems provides the most accurate positioning measurement?

1/1 point

- RTK GPS
- GPS
- DGPS

Correct

Correct! RTK uses phase of the GPS carrier signal to provide centimetre-level accuracy.

6. What is the minimum number of GPS satellites required to estimate the 3D position of a vehicle through trilateration?

2/2 points

✓ Correct

Correct! A minimum of four satellites is required to unambiguously calculate the vehicle's 3D position.