

#### **DelftX:** OT.1x Observation theory: Estimating the Unknown

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Warming up

- 1.1 What is the Problem?
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Graded Assignment due Feb 8, 2017 17:30 IST

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# **Exercises: Precision and covariance matrix**

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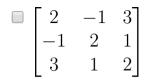
#### **Covariance matrix**

1/1 point (ungraded)

Which of the following matrices cannot be a covariance matrix?

$$\begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$$

- 3. Least Squares Estimation (LSE)
- 4. Best Linear Unbiased Estimation (BLUE)
- Pre-knowledgeMathematics
- MATLAB Learning Content





## **Explanation**

Variances cannot be negative, hence all diagonal elements should be larger than 0; Covariance matrices are always symmetric.

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✓ Correct (1/1 point)

## Calibration campaign: covariance matrix

1/1 point (ungraded)

Suppose the following standard deviations are given:

 $\sigma_{
m Laser} = 0.002$ 

 $\sigma_{Rope}=0.06$ 

 $\sigma_{BoyScout} = 0.1$ 

What is the covariance matrix if we take the following measurements of an unknown distance: 2 with the laser, 1 with rope and 2 with boy scout? Note:  $4e-6=4\times10^{-6}$ 

A) 
$$\begin{bmatrix} 4e-6 & 0 & 0 \\ 0 & 3.6e-3 & 0 \\ 0 & 0 & 0.01 \end{bmatrix}$$

C) 
$$\begin{bmatrix} 0.002 & 0 & 0 \\ 0 & 0.06 & 0 \\ 0 & 0 & 0.1 \end{bmatrix}$$

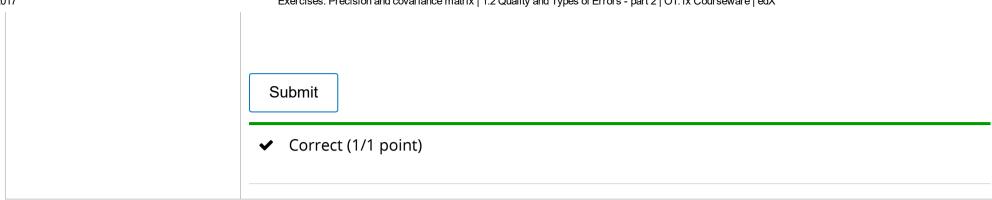
$$\mathsf{D}) \begin{bmatrix} 0.002 & 0 & 0 & 0 & 0 \\ 0 & 0.002 & 0 & 0 & 0 \\ 0 & 0 & 0.06 & 0 & 0 \\ 0 & 0 & 0 & 0.1 & 0 \\ 0 & 0 & 0 & 0 & 0.1 \end{bmatrix}$$

Which covariance matrix is correct?

B ▼ Answer: B

### **Explanation**

The variances are on the diagonal and are equal to the square of the given standard deviations.



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