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sandipan\_dey 🗸

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()

11.4.2 Change of Basis

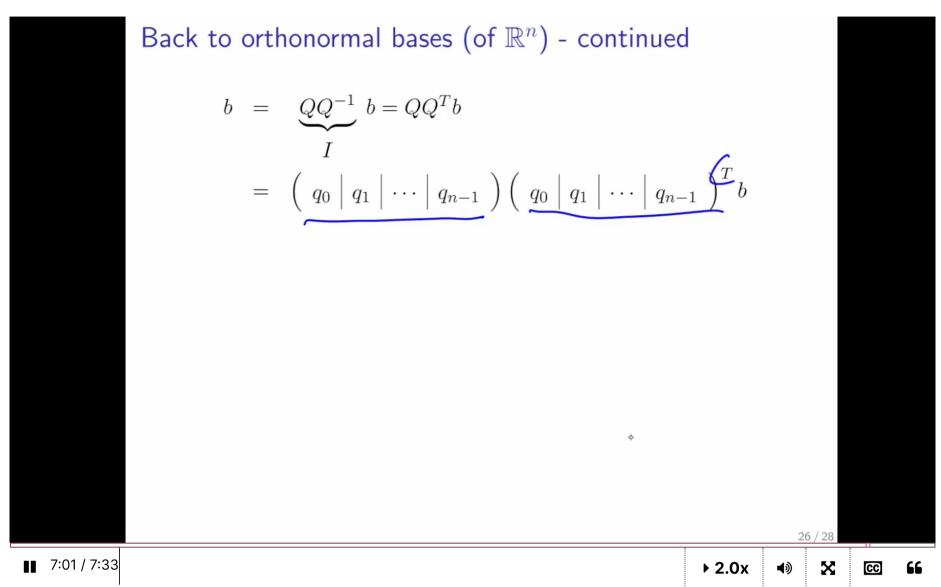
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Week 11 due Dec 22, 2023 21:12 IST Completed

# 11.4.2 Change of Basis

#### **Video**



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## Reading Assignment

0 points possible (ungraded)
Read Unit 11.4.2 of the notes. [LINK]



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## Homework 11.4.1

1/1 point (graded)

The vectors

$$q_0=rac{\sqrt{2}}{2}inom{1}{1}=inom{rac{\sqrt{2}}{2}}{rac{\sqrt{2}}{2}}\,,\quad q_1=rac{\sqrt{2}}{2}inom{-1}{1}=inom{-rac{\sqrt{2}}{2}}{rac{\sqrt{2}}{2}}\,.$$

are mutually orthonormal.

TRUE ~

✓ Answer: TRUE

**TRUE** 

Let  $Q=\left(egin{array}{c|c} q_0 & q_1 \end{array}
ight)$  . Then  $q_0$  and  $q_1$  are mutually orthonormal if and only if  $Q^TQ=I$  . Now,

$$Q^TQ = egin{pmatrix} rac{\sqrt{2}}{2} & -rac{\sqrt{2}}{2} \ rac{\sqrt{2}}{2} & rac{\sqrt{2}}{2} \end{pmatrix}^T egin{pmatrix} rac{\sqrt{2}}{2} & -rac{\sqrt{2}}{2} \ rac{\sqrt{2}}{2} & rac{\sqrt{2}}{2} \end{pmatrix} = egin{pmatrix} rac{\sqrt{2}}{2} & rac{\sqrt{2}}{2} \ -rac{\sqrt{2}}{2} & rac{\sqrt{2}}{2} \end{pmatrix} egin{pmatrix} rac{\sqrt{2}}{2} & -rac{\sqrt{2}}{2} \ rac{\sqrt{2}}{2} & rac{\sqrt{2}}{2} \end{pmatrix} = egin{pmatrix} 1 & 0 \ 0 & 1 \end{pmatrix}.$$

Hence, the vectors are mutually orthonormal.

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Answers are displayed within the problem

#### Homework 11.4.2.2

4/4 points (graded)

If  $Q \in \mathbb{R}^{n \times n}$  has mutually orthonormal columns then which of the following are true:

1. 
$$Q^TQ=I$$

TRUE 
$$ightharpoonup$$
 Answer: TRUE 2.  $QQ^T=I$ 

TRUE 
$$\checkmark$$
 Answer: TRUE 3.  $QQ^{-1}=I$ 

TRUE 
$$\checkmark$$
 Answer: TRUE 4.  $Q^{-1}=Q^T$ 

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