Practice Quiz, 7 questions

### **/**

## **Congratulations! You passed!**

Next Item



1/1 point

1

In this quiz you will diagonalise some matrices and apply this to simplify calculations.

Given the matrix  $T=\begin{bmatrix} 6 & -1 \\ 2 & 3 \end{bmatrix}$  and change of basis matrix  $C=\begin{bmatrix} 1 & 1 \\ 1 & 2 \end{bmatrix}$  (whose columns are eigenvectors of T), calculate the diagonal matrix  $D=C^{-1}TC$ .



$$\begin{bmatrix} 5 & 0 \\ 0 & 4 \end{bmatrix}$$



Correct

Well done!

- $\begin{bmatrix} 6 & 0 \\ 0 & 3 \end{bmatrix}$
- $\begin{bmatrix} 9 & 0 \\ 0 & 20 \end{bmatrix}$
- $\begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$



1 / 1 point  $\begin{array}{c} \text{Diagiven the station } \overline{a} n \begin{bmatrix} 2 & 7 \\ d & app \end{bmatrix} \text{ications} \text{ of basis matrix } C = \begin{bmatrix} 7 & 1 \\ -3 & 0 \end{bmatrix} \text{ (whose columns are practice general points)}, calculate the diagonal matrix } D = C^{-1}TC. \end{array}$ 

- $\begin{bmatrix} 1 & 0 \\ 0 & -2 \end{bmatrix}$
- $\begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$
- $\begin{bmatrix} 7 & 0 \\ 0 & 0 \end{bmatrix}$

**Correct**Well done!

1/1 point

3.

Given the matrix  $T=\begin{bmatrix}1&0\\2&-1\end{bmatrix}$  and change of basis matrix  $C=\begin{bmatrix}1&0\\1&1\end{bmatrix}$  (whose columns are eigenvectors of T), calculate the diagonal matrix  $D=C^{-1}TC$ .

- $\begin{bmatrix} 2 & 0 \\ 0 & -1 \end{bmatrix}$
- $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
- $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$

Correct

Well done!

$$\begin{bmatrix} 0 & 0 \\ 0 & -1 \end{bmatrix}$$

# Diagonalisation and applications

Practice Quiz, 7 questions

7/7 points (100%)

4.

Given a diagonal matrix  $D=egin{bmatrix} a & 0 \ 0 & a \end{bmatrix}$  , and a change of basis matrix  $C=egin{bmatrix} 1 & 2 \ 0 & 1 \end{bmatrix}$  with inverse

$$C = egin{bmatrix} 1 & -2 \ 0 & 1 \end{bmatrix}$$
 , calculate  $T = CDC^{-1}$  .

$$\begin{bmatrix} -a & 0 \\ 0 & -a \end{bmatrix}$$

#### Correct

Well done! As it turns out, because D is a special type of diagonal matrix, where all entries on the diagonal are the same, this matrix is just a scalar multiple of the identity matrix. Hence, given any change of co-ordinates, this matrix remains the same.



5

Given that  $T=egin{bmatrix} 6 & -1 \ 2 & 3 \end{bmatrix}=egin{bmatrix} 1 & 1 \ 1 & 2 \end{bmatrix}egin{bmatrix} 5 & 0 \ 0 & 4 \end{bmatrix}egin{bmatrix} 2 & -1 \ -1 & 1 \end{bmatrix}$  , calculate  $T^3$  .

$$\begin{bmatrix}
122 & 186 \\
-61 & 3
\end{bmatrix}$$

$$\begin{bmatrix} -61 & 3 \\ 122 & 186 \end{bmatrix}$$

#### Correct

Well done!

1/1 point

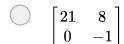
Given that  $T = \begin{bmatrix} 2 & 7 \\ 0 & -1 \end{bmatrix} = \begin{bmatrix} 7 & 1 \\ -3 & 0 \end{bmatrix} \begin{bmatrix} -1 & 0 \\ 0 & 2 \end{bmatrix} \begin{bmatrix} 0 & -1/3 \\ 1 & 7/3 \end{bmatrix}$  , calculate  $T^3$ .



$$\begin{bmatrix} 8 & 21 \\ 0 & -1 \end{bmatrix}$$



Well done!



$$\begin{bmatrix} -1 & 21 \\ 8 & 0 \end{bmatrix}$$



Given that  $T=egin{bmatrix}1&0\\2&-1\end{bmatrix}=egin{bmatrix}1&0\\1&1\end{bmatrix}egin{bmatrix}1&0\\0&-1\end{bmatrix}egin{bmatrix}1&0\\-1&1\end{bmatrix}$  , calculate  $T^5$  .



$$\begin{bmatrix} 1 & 0 \\ 2 & -1 \end{bmatrix}$$



Well done!

$$\begin{bmatrix} -1 & 0 \\ 2 & 1 \end{bmatrix}$$



