Congratulations! You passed!

TO PASS 80% or higher

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GRADE
100%

Selecting eigenvectors by inspection

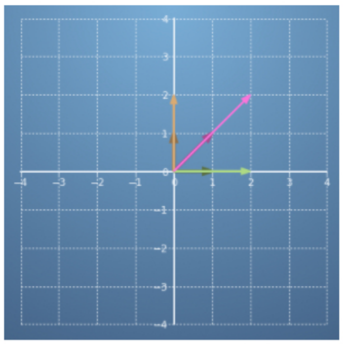
TOTAL POINTS 6

1. Recall that for a linear transformation, an eigenvector is a vector which, after applying the transformation, stays in the same span. In the following questions, you will try to geometrically see which vectors of a linear transformation are eigenvectors.

1 / 1 point

In the following diagram, the dark green vector is given by $\begin{bmatrix}1\\0\end{bmatrix}$, the purple vector by $\begin{bmatrix}1\\1\end{bmatrix}$ and the brown vector by $\begin{bmatrix}0\\1\end{bmatrix}$.

The transformation $T = \begin{bmatrix}2 & 0\\0 & 2\end{bmatrix}$ is applied, which sends the three vectors to the light green vector $\begin{bmatrix}2\\0\end{bmatrix}$, the magenta vector $\begin{bmatrix}2\\2\end{bmatrix}$ and the orange vector $\begin{bmatrix}0\\2\end{bmatrix}$, respectively.



Which of the three original vectors are eigenvectors of the linear transformation T?

- [x] $\begin{bmatrix}1\\0\end{bmatrix}$

Correct
This eigenvector has eigenvalue 2, which means that it stays in the same direction but doubles in size.

- [x] $\begin{bmatrix}1\\1\end{bmatrix}$

Correct
This eigenvector has eigenvalue 2, which means that it stays in the same direction but doubles in size.

- [x] $\begin{bmatrix}0\\1\end{bmatrix}$

Correct
This eigenvector has eigenvalue 2, which means that it stays in the same direction but doubles in size.

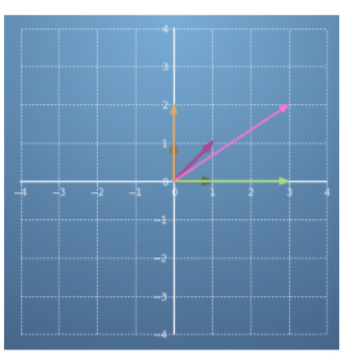
- [ ] None of the above.

2. Recall that for a linear transformation, an eigenvector is a vector which, after applying the transformation, stays in the same span. In the following questions, you will try to geometrically see which vectors of a linear transformation are eigenvectors.

1 / 1 point

In the following diagram, the dark green vector is given by $\begin{bmatrix}1\\0\end{bmatrix}$, the purple vector by $\begin{bmatrix}1\\1\end{bmatrix}$ and the brown vector by $\begin{bmatrix}0\\1\end{bmatrix}$.

The transformation $T = \begin{bmatrix}3 & 0\\0 & 2\end{bmatrix}$ is applied, which sends the three vectors to the light green vector $\begin{bmatrix}3\\0\end{bmatrix}$, the magenta vector $\begin{bmatrix}3\\2\end{bmatrix}$ and the orange vector $\begin{bmatrix}0\\2\end{bmatrix}$, respectively.



Which of the three original vectors are eigenvectors of the linear transformation T?

- [x] $\begin{bmatrix}1\\0\end{bmatrix}$

✓ **Correct**
This eigenvector has eigenvalue 3, which means that it stays in the same direction but triples in size.

- [ ] $\begin{bmatrix}1\\1\end{bmatrix}$
- [x] $\begin{bmatrix}0\\1\end{bmatrix}$

✓ **Correct**
This eigenvector has eigenvalue 2, which means that it stays in the same direction but doubles in size.

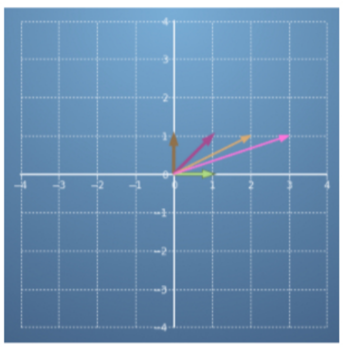
- [ ] None of the above.

3. Recall that for a linear transformation, an eigenvector is a vector which, after applying the transformation, stays in the same span. In the following questions, you will try to geometrically see which vectors of a linear transformation are eigenvectors.

1 / 1 point

In the following diagram, the dark green vector is given by $\begin{bmatrix}1\\0\end{bmatrix}$, the purple vector by $\begin{bmatrix}1\\1\end{bmatrix}$ and the brown vector by $\begin{bmatrix}0\\1\end{bmatrix}$.

The transformation $T = \begin{bmatrix}1 & 2\\0 & 1\end{bmatrix}$ is applied, which sends the three vectors to the light green vector $\begin{bmatrix}1\\0\end{bmatrix}$, the magenta vector $\begin{bmatrix}3\\1\end{bmatrix}$ and the orange vector $\begin{bmatrix}2\\1\end{bmatrix}$, respectively.



Which of the three original vectors are eigenvectors of the linear transformation T?

- [x] $\begin{bmatrix}1\\0\end{bmatrix}$

✓ **Correct**
Well done! This eigenvector has eigenvalue 1 - which means that it is unchanged by this transformation.

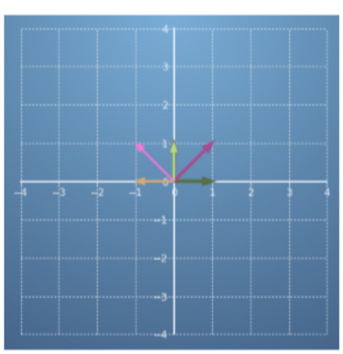
- [ ] $\begin{bmatrix}1\\1\end{bmatrix}$
- [ ] $\begin{bmatrix}0\\1\end{bmatrix}$
- [ ] None of the above.

4. Recall that for a linear transformation, an eigenvector is a vector which, after applying the transformation, stays in the same span. In the following questions, you will try to geometrically see which vectors of a linear transformation are eigenvectors.

1 / 1 point

In the following diagram, the dark green vector is given by $\begin{bmatrix}1\\0\end{bmatrix}$, the purple vector by $\begin{bmatrix}1\\1\end{bmatrix}$ and the brown vector by $\begin{bmatrix}0\\1\end{bmatrix}$.

The transformation $T = \begin{bmatrix}0 & -1\\1 & 0\end{bmatrix}$ is applied, which sends the three vectors to the light green vector $\begin{bmatrix}0\\1\end{bmatrix}$, the magenta vector $\begin{bmatrix}-1\\1\end{bmatrix}$ and the orange vector $\begin{bmatrix}-1\\0\end{bmatrix}$, respectively.



Which of the three original vectors are eigenvectors of the linear transformation T? Select all correct answers.

- [ ] $[1]$

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

☐ $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$

☐ $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$

☑ None of the above.

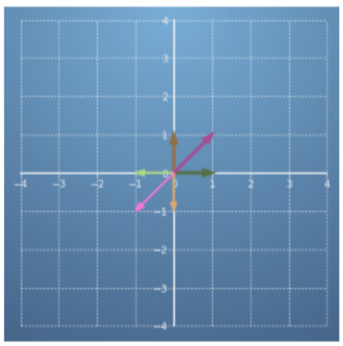
✓ **Correct**
None of the three original vectors remain on the same span after the linear transformation. In fact, this linear transformation has no eigenvectors in the plane.

5. Recall that for a linear transformation, an eigenvector is a vector which, after applying the transformation, stays in the same span. In the following questions, you will try to geometrically see which vectors of a linear transformation are eigenvectors.

1 / 1 point

In the following diagram, the dark green vector is given by $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$, the purple vector by $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$ and the brown vector by $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$.

The transformation $T = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$ is applied, which sends the three vectors to the light green vector $\begin{bmatrix} -1 \\ 0 \end{bmatrix}$, the magenta vector $\begin{bmatrix} -1 \\ -1 \end{bmatrix}$ and the orange vector $\begin{bmatrix} 0 \\ -1 \end{bmatrix}$, respectively.



Which of the three original vectors are eigenvectors of the linear transformation T?

☑ $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$

✓ **Correct**
This eigenvector has eigenvalue -1, which means that it reverses direction but has the same size.

☑ $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$

✓ **Correct**
This eigenvector has eigenvalue -1, which means that it reverses direction but has the same size.

☑ $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$

✓ **Correct**
This eigenvector has eigenvalue -1, which means that it reverses direction but has the same size.

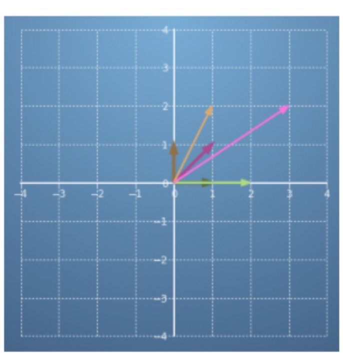
☐ None of the above

6. Recall that for a linear transformation, an eigenvector is a vector which, after applying the transformation, stays in the same span. In the following questions, you will try to geometrically see which vectors of a linear transformation are eigenvectors.

1 / 1 point

In the following diagram, the dark green vector is given by $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$, the purple vector by $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$ and the brown vector by $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$.

The transformation $T = \begin{bmatrix} 2 & 1 \\ 0 & 2 \end{bmatrix}$ is applied, which sends the three vectors to the light green vector $\begin{bmatrix} 2 \\ 0 \end{bmatrix}$, the magenta vector $\begin{bmatrix} 3 \\ 2 \end{bmatrix}$ and the orange vector $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$, respectively.



Which of the three original vectors are eigenvectors of the linear transformation T?

- [x] $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$

Correct
This eigenvector has eigenvalue 2, which means that it stays in the same direction but doubles in size.

- [ ] $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$
- [ ] $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$
- [ ] None of the above.