Warmup example

Let's practice encoding linear transformations as matrices, as described in the previous article. For instance, suppose we want to find a matrix which corresponds with a 90° rotation.

The first column of the matrix tells us where the vector $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$ goes, and—looking at the animation—we see that this vector lands on $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$. Based on this knowledge, we start filling in our matrix like this:

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

For the second column, we ask where the vector $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$ lands. Rotating this upward facing vector 90° yields a leftward facing arrow—i.e., the vector $\begin{bmatrix} -1 \\ 0 \end{bmatrix}$—so we can finish writing our matrix as $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$.

Now you try!

Practice problems

Problem 1

What matrix corresponds with the following transformation?

Choose 1 answer:

(A)

$$\begin{bmatrix} 0.5 & 0 \\ 0 & 0.5 \end{bmatrix}$$

(B)

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

(C)

$$\begin{bmatrix} 1 & 0.5 \\ 0.5 & 1 \end{bmatrix}$$

(D)

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

Check

Problem 2

What matrix corresponds with the following transformation?

Choose 1 answer:

A

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

B

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

C

$$\begin{bmatrix} 1 & 0.5 \\ 0.5 & 1 \end{bmatrix}$$

D

$$\begin{bmatrix} 0.5 & 0 \\ 0 & 0.5 \end{bmatrix}$$

Check

Problem 3

What matrix corresponds with the following transformation?

Choose 1 answer:

A

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

B

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

C

$$\begin{bmatrix} 0.5 & 0 \\ 0 & 0.5 \end{bmatrix}$$

D

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

Check

Problem 4

What matrix corresponds with the following transformation?

Choose 1 answer:

A

$$\begin{bmatrix} 1 & 0.5 \\ 0.5 & 1 \end{bmatrix}$$

B

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

C

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

D

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

Check

Problem 5

What matrix corresponds with the following transformation?

Choose 1 answer:

A

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

B

$\begin{bmatrix} 1 & 0.5 \\ 0.5 & 1 \end{bmatrix}$

C

$\begin{bmatrix} 0.5 & 0 \\ 0 & 0.5 \end{bmatrix}$

D

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

Check

Problem 6

What matrix corresponds with the following transformation?

Choose 1 answer:

A

$\begin{bmatrix} 1 & 0.5 \\ 0.5 & 1 \end{bmatrix}$

B

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

C

$$\begin{bmatrix} 0.5 & 0 \\ 0 & 0.5 \end{bmatrix}$$

D

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