2.4.4 Rotations and Reflections, Revisited

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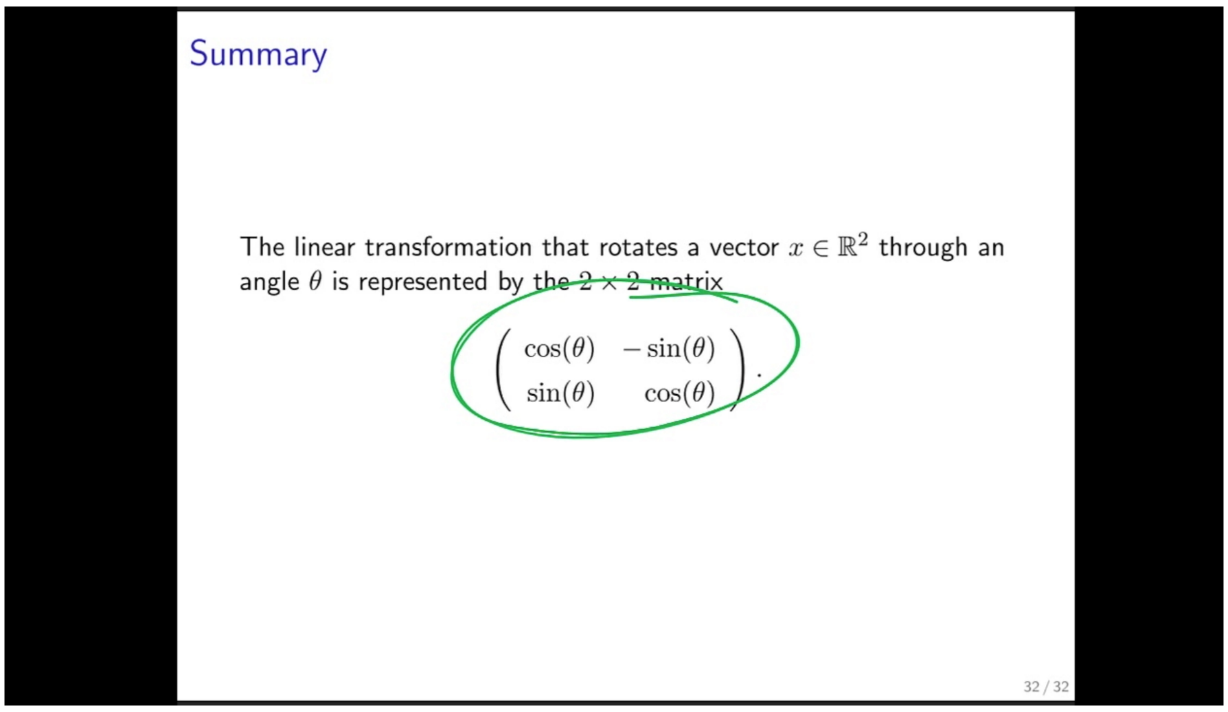
Calculator

Week 2 due Oct 11, 2023 16:42 IST

2.4.4 Rotations and Reflections, Revisited



3:34 / 3:35 2.0x

vector through theta, we know that that's just R theta of that vector.

And we now know that that's the same as multiplying the vector by this two

by two matrix.

And when we do that we get the following result.

So the linear transformation that rotates a vector x through an angle

theta can be represented by this two by two matrix.

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Reading Assignment

0 points possible (ungraded)

Read Unit 2.4.4 of the notes. [LINK]

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This is such an illuminating lecture, thank you
I learned matrices back in my competitive high school. The rotation matrix was just given, likely there wasn't time then to explain why it looked li... 1

? What are you asking me to do?
Why did you introduce the trigonometry if it was not part of the solutions to this problem? Examining my text (I purchased from the webpage for 5

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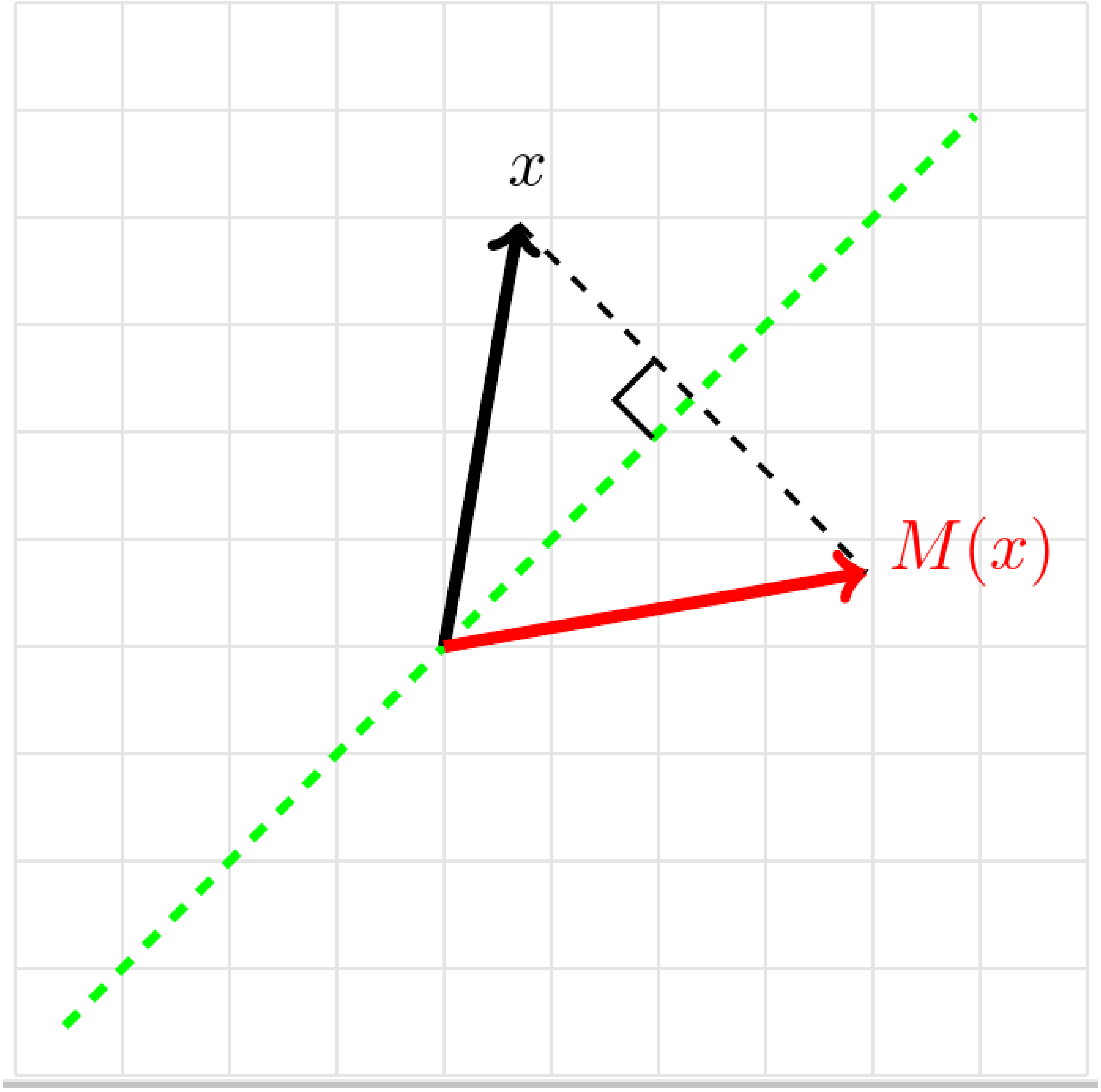
Homework 2.4.4.1

6/6 points (graded)

A reflection with respect to a 45 degree line is illustrated by



Think of the dashed green line as a mirror. Let $M : \mathbb{R}^2 \to \mathbb{R}^2$ be the vector function that maps a vector to its mirror image. Evaluate (by examining the picture)

$$\begin{pmatrix} \chi_0 \\ \chi_1 \end{pmatrix} = M\left(\begin{pmatrix} 1 \\ 0 \end{pmatrix}\right)$$

χ_0 0 ✔ Answer: 0 χ_1 1 ✔ Answer: 1

$$\begin{pmatrix} \chi_0 \\ \chi_1 \end{pmatrix} = M\left(\begin{pmatrix} 0 \\ 3 \end{pmatrix}\right)$$

χ_0 3 ✔ Answer: 3 χ_1 0 ✔ Answer: 0

$$\begin{pmatrix} \chi_0 \\ \chi_1 \end{pmatrix} = M\left(\begin{pmatrix} 1 \\ 2 \end{pmatrix}\right)$$

χ_0 2 ✔ Answer: 2 χ_1 1 ✔ Answer: 1

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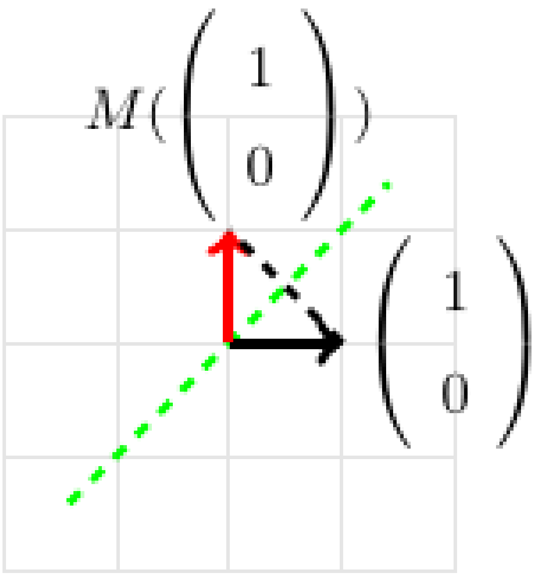
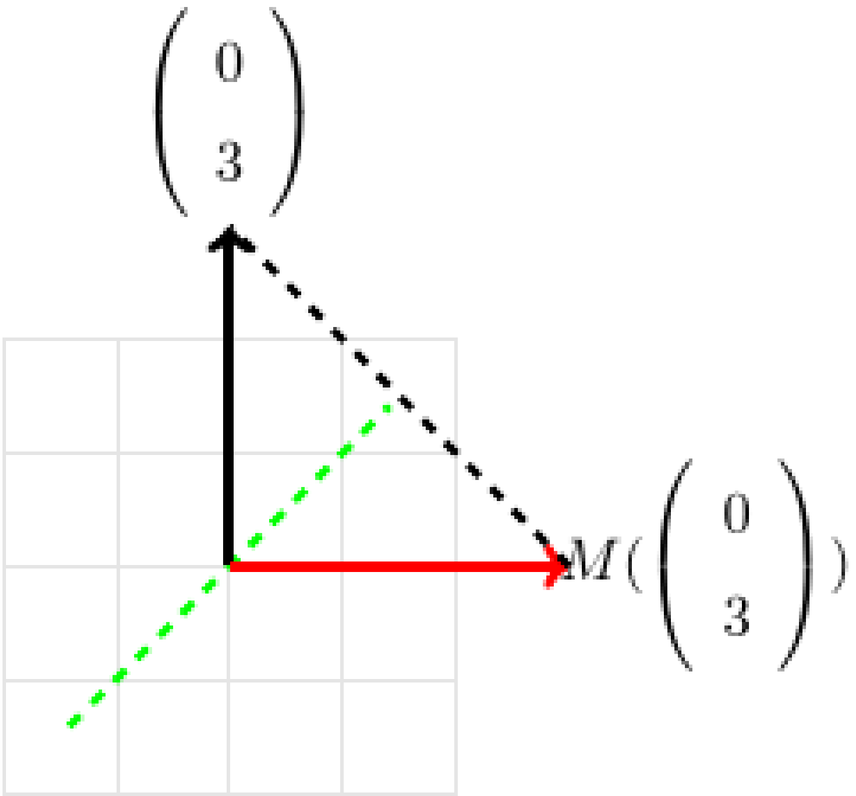
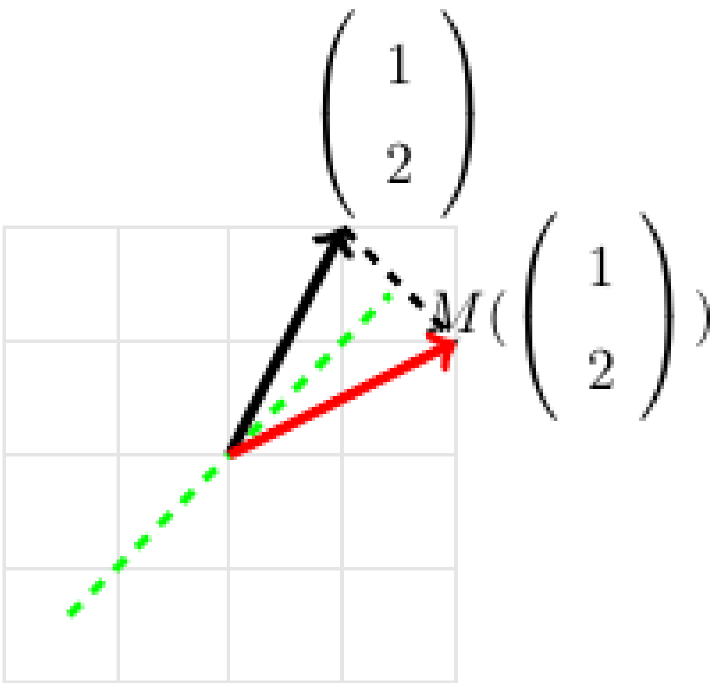
χ_0 2 Answer: 2 χ_1 1 Answer: 1

Explanation







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Answers are displayed within the problem

Homework 2.4.4.2

4/4 points (graded)

A reflection with respect to a 45 degree line is illustrated by

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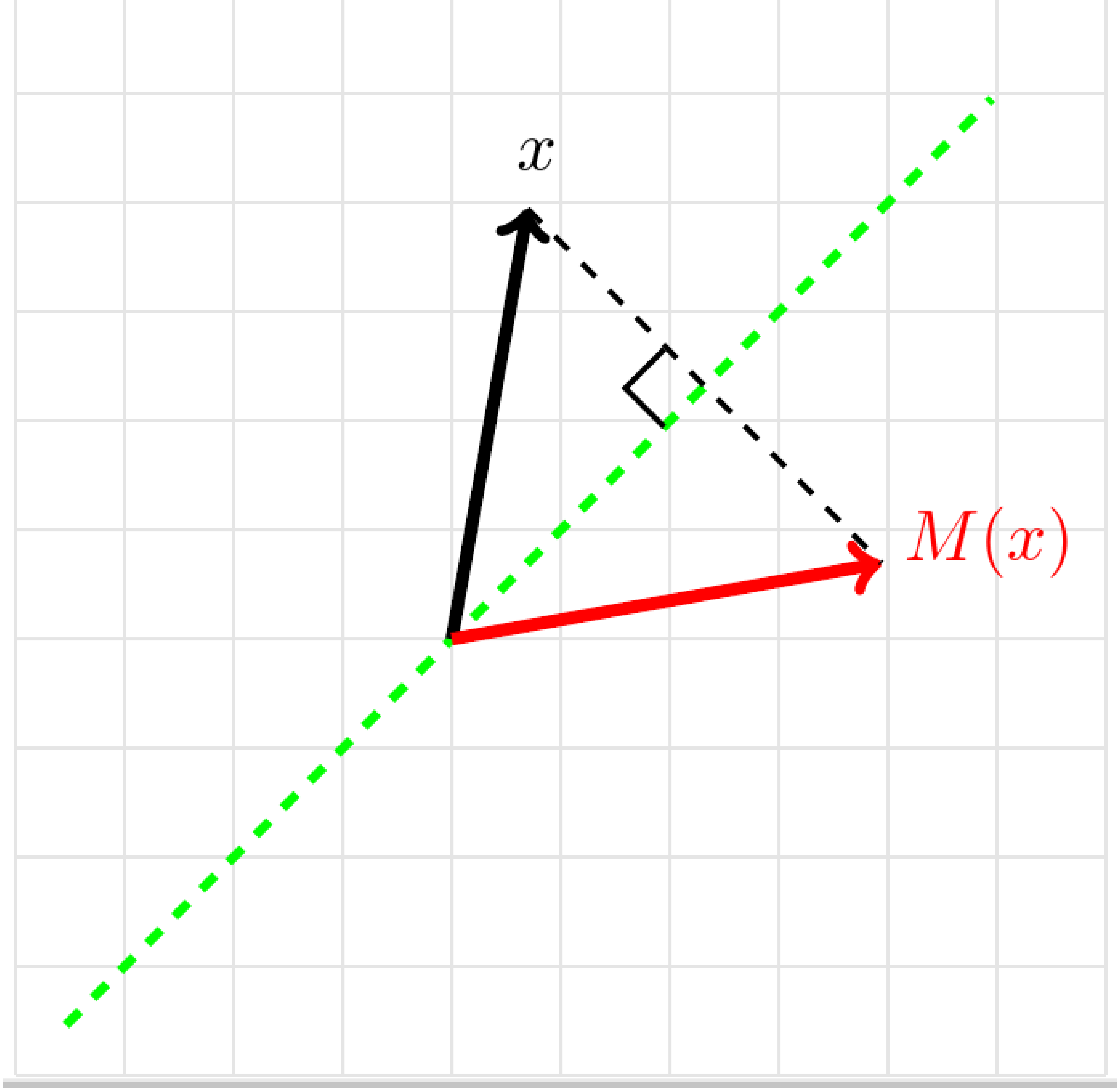


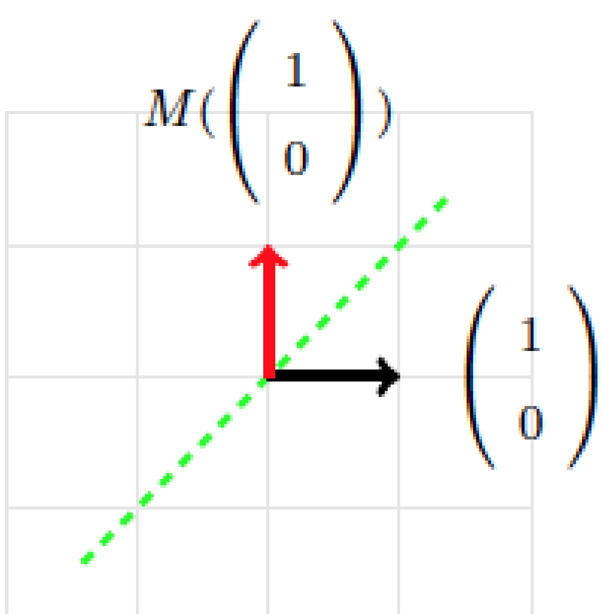
Again, think of the dashed green line as a mirror and let $M : \mathbb{R}^2 \to \mathbb{R}^2$ be the vector function that maps a vector to its mirror image. Compute the matrix that represents M (by examining the picture)

$M =$	0	✔ Answer: 0	1	✔ Answer: 1
	1	✔ Answer: 1	0	✔ Answer: 0

Explanation

Answer:

- $M(\begin{pmatrix} 1 \\ 0 \end{pmatrix}) = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$:



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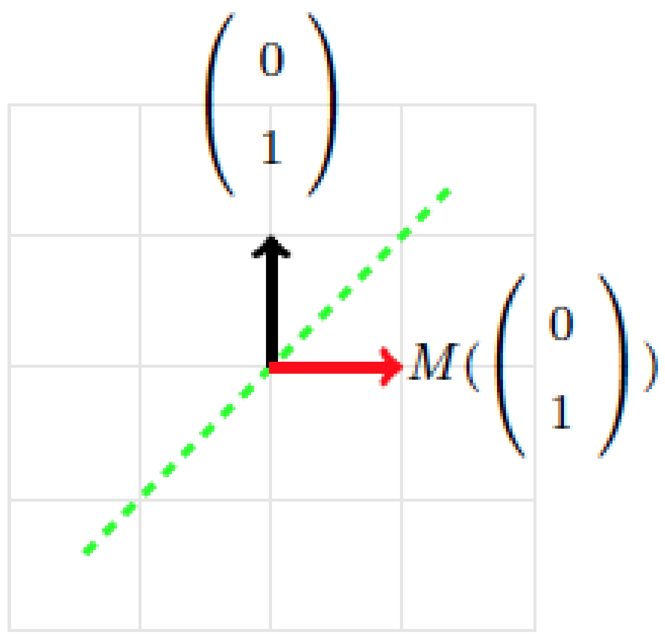
- $M(\begin{pmatrix} 0 \\ 1 \end{pmatrix}) = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$:



Hence the matrix is $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$

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Answers are displayed within the problem

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