Lesson 28: When Can We Reverse a Transformation?

Classwork

Opening Exercise

Perform the operation on the unit square.

* 1. State the vertices of the transformation.
  2. Explain the transformation in words.
  3. Find the area of the transformed figure.
  4. If the original square was instead of a unit square, how would the transformation change?
  5. What is the area of the image? Explain how you know.

**Example 1**

What transformation reverses a pure dilation from the origin with a scale factor of ?

* 1. Write the pure dilation matrix and multiply it by .
  2. What values of , and would produce the identity matrix? (Hint: Write and solve a system of equations.)
  3. Write the matrix and confirm that it reverses the pure dilation with a scale factor of .

Exercises 1–3

Find the inverse matrix and verify.

Problem Set

1. In this lesson, we learned . Chad was saying that he found an easy way to find the inverse matrix, which is: His argument is that if we have , then .
   1. Is Chad correct? Explain your reason.
   2. If Chad is not correct, what is the correct way to find the inverse matrix?
2. Find the inverse matrix and verify it.
3. Find the starting point if
   1. the point is the image of a pure dilation with a factor of .
   2. the point is the image of a pure dilation with a factor of .
   3. the point is the image of a pure dilation with a factor of .
   4. the point is the image of a pure dilation with a factor of .
4. Find the starting point if
   1. is the image of a reflection about the real axis.
   2. is the image of a reflection about the imaginary axis.
   3. is the image of a reflection about the real axis and then the imaginary axis.
   4. is the image of a radians counterclockwise rotation.
5. Let’s call the pure counterclockwise rotation of the matrix as , and the “undo” of the pure rotation is as .
   1. Simplify .
   2. What would you get if you multiply to ?
   3. Write the matrix if you want to rotate radians counterclockwise.
   4. Write the matrix if you want to rotate radians clockwise.
   5. Write the matrix if you want to rotate radians counterclockwise.
   6. Write the matrix if you want to rotate radians counterclockwise.
   7. If the point is the image of radians counterclockwise rotation, find the starting point .
   8. If the point is the image of radians counterclockwise rotation, find the starting point .