

Lesson 4: An Appearance of Complex Numbers

Classwork

Opening Exercise

Is $R(x) = \frac{1}{x}$ a linear transformation? Explain how you know.

Exercises

1. Solve $5x^2 - 3x + 17 = 9$.

2. Use the fact that $i^2 = -1$ to show that $i^3 = -i$. Interpret this statement geometrically.

3. Calculate i^6 .

4. Calculate i^5 .

Problem Set

1. Solve the equation below.
 $5x^2 - 7x + 8 = 2$
2. Consider the equation $x^3 = 8$.
 - a. What is the first solution that comes to mind?
 - b. It may not be easy to tell at first, but this equation actually has three solutions. To find all three solutions, it is helpful to consider $x^3 - 8 = 0$, which can be rewritten as $(x - 2)(x^2 + 2x + 4) = 0$ (check this for yourself). Find all of the solutions to this equation.
3. Make a drawing that shows the first 5 powers of i (i.e., i^1, i^2, \dots, i^5), and then confirm your results algebraically.
4. What is the value of i^{99} ? Explain your answer using words or drawings.
5. What is the geometric effect of multiplying a number by $-i$? Does your answer make sense to you? Give an explanation using words or drawings.