Lesson 4: An Appearance of Complex Numbers

Classwork

Opening Exercise

Is $R\left(x\right)=\frac{1}{x}$ 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.

$$5x^{2}-7x+8=2$$

1. Consider the equation $x^{3}=8$.
	1. What is the first solution that comes to mind?
	2. 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 $\left(x-2\right)\left(x^{2}+2x+4\right)=0$ (check this for yourself). Find all of the solutions to this equation.
2. Make a drawing that shows the first $5$ powers of $i$ (i.e., $i^{1}, i^{2}, …,i^{5}$), and then confirm your results algebraically.
3. What is the value of $i^{99}$? Explain your answer using words or drawings.
4. 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.