

Lesson 32- Dividing Complex Numbers (Rationalize).notebook

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Lesson 31- Objective-SWBAT divide complex numbers by rationalizing the denominator.

Kickoff

- 1) Find the polynomial function given the roots of: $(-4, \sqrt{7})$
- 2) Find the minimums, maximums and intervals where the function is increasing and decreasing.

$$f(x) = -5x^3 + 9x^2 + x - 5$$

$$\begin{aligned} \textcircled{1} \quad & X = -4 \quad (x)(\sqrt{7}) \\ & X + 4 = \quad X^2 = 7 \\ & (X+4)(X^2-7) \quad X^2-7=0 \\ & X^3 \cdot 7x + 4x^2 - 28 \\ & f(x) = x^3 + 4x^2 - 7x - 28 \\ & X = -4 \quad X = \sqrt{7} \quad X = -\sqrt{7} \\ \textcircled{2} \quad & \min \cdot (-0.053, -5) \\ & \max (1.253, 5.47) \\ & \text{INC} \cdot (-0.053, 1.253) \\ & \text{DEC} \cdot (-\infty, -0.053) \cup (1.253, \infty) \end{aligned}$$

$$\{-4, \sqrt{7}\}$$

Homework

- ① $\frac{1}{7-3i}$ ② $\frac{1}{5+4i}$
- ③ $\frac{2}{10}$ ④ $\frac{3}{4i}$
- ⑤ $\frac{4}{(1-i)^2}$
- ⑥ $\frac{(1-i)(1+i)}{3i}$
- ⑦ $\frac{40}{(1-i)^2(2-i)}$
- ⑧ $\frac{1}{\sqrt{100}}$
- ⑨ $\frac{1}{4-2\sqrt{3}}$
- ⑩ $\frac{8+10i}{(1-i)^2}$
- ⑪ $\frac{5}{3}$ ⑫ $\frac{8}{3}$
- ⑬ $\frac{(2-3i)(1-2i)}{4-3i}$
- ⑭ $\frac{(3+2i)(7-i)}{3+10}$
- ⑮ $\frac{8i-3i^2}{1-3i+2i^2}$
- ⑯ $\frac{(4+5i)^2 - (4+5i)(4-5i)}{(4+5i)(4-5i)}$
- ⑰ $\frac{(6+2i)(8+3i)}{(4+3i)(4-3i)}$
- ⑱ $\frac{-6+12+48i}{8i^2}$
- ⑲ $\frac{-3 \cdot 6}{4} = -\frac{27}{4}$

Dividing Complex Numbers (Rationalize)

Try This: Rationalize the denominator.

$$1) \frac{\sqrt{2}}{\sqrt{6}} = \frac{\sqrt{2} \cdot \sqrt{6}}{2 \cdot 6} = \frac{2\sqrt{3}}{12}$$

$$2) \frac{4}{2+\sqrt{7}} \cdot \frac{(2-\sqrt{7})}{(2-\sqrt{7})}$$

$$\frac{\sqrt{3}}{6}$$

$$\frac{8-4\sqrt{7}}{4-7}$$

$$\frac{8-4\sqrt{7}}{-3}$$

$$\frac{-\frac{8}{3} + \frac{4\sqrt{7}}{3}}{-3}$$

Rationalize the Denominator that are monomials

- 1) Multiply num + denom by i
- 2) Simplify i's
- 3) Reduce!

Examples:

$$\begin{aligned} 1) \frac{5}{i} \quad & i = \frac{5i}{i^2} = \frac{5i}{-1} \\ & \textcircled{-5i} \end{aligned}$$

$$\begin{aligned} 2) \frac{3}{4i} \quad & i = \frac{3i}{-4i^2} \\ & \textcircled{-\frac{3i}{4}} \end{aligned}$$

$$\begin{aligned} 3) \frac{2+4i}{i} \quad & i = \frac{2i+4i^2}{-6i^2} \\ & \textcircled{\frac{2}{3} - \frac{1}{3}i} \end{aligned}$$

$$4) \frac{8}{5i}$$

$$6) \frac{3+7i}{4i}$$

$$6) \frac{4+2i}{8i}$$

Rationalize the Denominator that are Binomials:

1) Multiply num + denom by conjugate

2) Simplify i's

3) Reduce!

Examples:

$$1) \frac{5}{6+i}$$

$$\frac{30-5i}{36-i^2(-1)} = \frac{30-5i}{37}$$

$$2) \frac{8+i}{2-i}$$

$$3) \frac{1+3i}{2+4i}$$

$$4) \frac{5+i\sqrt{3}}{5-i\sqrt{3}}$$

Practice:

$$1) \frac{1-i}{1+i}$$

$$2) \frac{4+3i}{2-3i}$$

$$3) \frac{6+i}{6-i}$$

$$4) \frac{2+i\sqrt{5}}{1-i\sqrt{5}}$$