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) $-5x^3+9x^2+x-5$

① $x=-4$ $\quad (x)^2=(\sqrt{7})^2$

$x+4=$ $\quad x^2=7$

$x^2-7=0$

$(x+4)(x^2-7)$

$x^3-7x+4x^2-28$

$f(x)=x^3+4x^2-7x-28$

$x=-4 \quad x=\sqrt{7} \quad x=-\sqrt{7}$

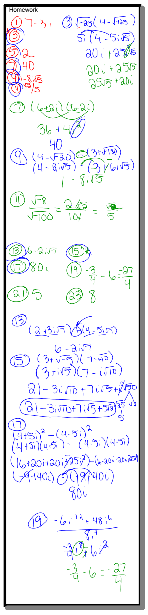
② min - $(-0.053, -5.02)$

max $(1.253, .547)$

Inc - $(-0.053, 1.253)$

Dec - $(-\infty, -0.053) \cup (1.253, \infty)$

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



Dividing Complex Numbers (Rationalize)

Try This: Rationalize the denominator.

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

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

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

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

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

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

Rationalize the Denominator that are monomials

1) Multiply num + denom by i

2) Simplify i's

3) Reduce!

Examples:

1) $\frac{5}{i} \cdot \frac{i}{i} = \frac{5i}{i^2} = \frac{5i}{-1}$

$-5i$

2) $\frac{3}{4i} \cdot \frac{i}{i} = \frac{3i}{-4i^2}$

$-\frac{3i}{4}$

3) $\frac{2+4i}{6i} \cdot \frac{i}{i}$

$\frac{2i+4i^2}{-6i^2}$

$\frac{2i-4}{-6}$

$-\frac{1}{3}i+\frac{2}{3}$

$\frac{2}{3}-\frac{1}{3}i$

4) $\frac{8}{5i}$ $\quad$ 6) $\frac{3+7i}{4i}$ $\quad$ 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) $\frac{5}{6+i} \cdot \frac{(6-i)}{(6-i)}$

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

$$\frac{30}{37} - \frac{5i}{37}$$

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