P.6 Complex Numbers

Objectives: 1) I can write a complex number in standard form.

2) I can add/subtract complex numbers.

3) I can multiply complex numbers.

4) I can find the conjugate of a complex number.

5) I can use conjugates to write a complex number in standard form.

Aug 31-2:05 PM

P.5 #21 $ax^2+bx+c=0$

$-3x+4=x^2-3x-4$

$-3x \quad -4$

$x^2-3x-4=0$

$x=\frac{-(-3)\pm\sqrt{(-3)^2-4(1)(-4)}}{2(1)}$

$x=\frac{3\pm 5}{2}$

$x=4,-1$

Factoring #18 a^4+2a^2-63

$(a^2-7)(a^2+9)$

Sep 5-11:03 AM

Quick Radical Review

$\sqrt{18}$

$9 \quad 2$

$3 \quad 3$

$\sqrt{3^2\cdot 2}$

$\sqrt{3^2}\cdot\sqrt{2}$

$3\sqrt{2}$

$5\sqrt[3]{24}$

$6 \quad 4$

$3 \quad 2 \quad 2$

$2\cdot 5\sqrt[3]{3}$

$10\sqrt[3]{3}$

$\sqrt[3]{2^3}\cdot\sqrt[3]{3}$

$\sqrt{27}$

$9 \quad 3$

$3 \quad 3$

$3^2\cdot 3$

$3\sqrt{3}$

$\sqrt{66}$

$11 \quad 6$

$2 \quad 3$

Aug 31-2:42 PM

Complex Numbers

$i=\sqrt{-1}$ or $i^2=-1$

Definition

Complex numbers are numbers of the form $a+bi$, where a and b are real numbers. The real number a is called the real part and the number b is called the imaginary part.

ex. $4+5i$

Sep 1-12:14 PM

$\sqrt{-16}$ $\sqrt{-3}$

$4i$ $\sqrt{3}\,i$ or $i\sqrt{3}$

1

Sep 1-2:05 PM

Add:

$(4-3i)+(-2+5i)$

$2+2i$

$\left(4+\sqrt{-25}\right)+\left(-6-\sqrt{-16}\right)$

$5i$ $4i$

$-2+i$

Subtract:

$(-3+7i)-(5-4i)$

$-8+11i$

$\left(3+\sqrt{-12}\right)-\left(-2-\sqrt{-27}\right)$

$4\ 3$ $9\ 3$

$\left(3+2i\sqrt{3}\right)-\left(-2-3i\sqrt{3}\right)$

$5+5i\sqrt{3}$

$5+5\sqrt{3}\,i$

Sep 1-2:06 PM

Multiply

$i=\sqrt{-1}$ $i^2=-1$

$4i(3-6i)$

$12i-24i^2$

$12i-24(-1)$

$12i+24$

$24+12i$

$(2+3i)^2$

$(2+3i)(2+3i)$

$4+6i+6i+9i^2$

$-5+12i$

$(-2+4i)(3-i)$

$-6+2i+12i-4i^2$

$-6+14i-4i^2$

$-6+14i-4(-1)$

$-2+14i$

Sep 1-2:09 PM

Complex Conjugates

Multiply (What Happens?)

complex conjugate

$(4+3i)(4-3i)$

$16-12i+12i-9i^2$

$16+9$

25

$-1+2i$ $3i$

$-1-2i$ $-3i$

$1-3i$

$1+3i$

Sep 1-2:11 PM

Write the expression in standard form.

$\frac{1}{(3+i)}\cdot\frac{(3-i)}{(3-i)} = \frac{3-i}{9+3i-3i-i^2} = \frac{3-i}{10}$ $a+bi$

$\frac{3}{10} - \frac{1}{10}i$

$\frac{(1+i)}{(2-i)}\cdot\frac{(2+i)}{(2+i)} = \frac{2+i+2i+i^2}{4+2i-2i-i^2}$

$= \frac{1+3i}{5} = \frac{1}{5}+\frac{3}{5}i$

$a+bi$

Sep 1-2:31 PM

$i = \sqrt{-1}$

$i^2 = (\sqrt{-1})^2 = -1$

$i^3 = i^2 \cdot i = -1 \cdot i = -i$

$i^4 = i^2 \cdot i^2 = (-1)(-1) = 1$

$i^5 = i^4 \cdot i = (1)i = i$

$i^6 = i^4 i^2 = (1)(-1) = -1$

$i^7 = i^6 \cdot i = (-1)i = -i$

$i^8 = i^4 i^4 = (1)(1) = 1$

$i^9 = i^8 \cdot i = (1)i = i$

Sep 1-2:41 PM