5.6 Day 1

Obj: 1. Graph & perform operations with complex numbers.

Solve: $x^2+1=0$

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

$x=\pm\sqrt{-1}$

$\sqrt{-1}=i$

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

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

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

$i^4=i\cdot i\cdot i\cdot i=-1\cdot -1=1$

repeats

$i^5=i$

$i^6=-1$

$i^7=-i$

$i^8=1$

"I won, I won!"

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Complex #: any # that can be written in the form $a+bi$.

real part — imaginary part

$2+3i$

real: 2
imag: 3i

$6i$

real: 0
imag: 6i

5

real: 5
imag: 0i

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Find x and y if $7x - 2iy = 14 + 6i$

$7x = 14$

$x = 2$

$\frac{-2iy}{-2i} = \frac{6i}{-2i}$

$y = -3$

$2x + 3iy = -8 + 10i$

$2x = -8$

$x = -4$

$\frac{3iy}{3i} = \frac{10i}{3i}$

$y = \frac{10}{3}$

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Find the sum or difference:

standard form: $a+bi$

$(-3+5i) + (7-6i)$

$-3+5i+7-6i$

$4 - i$

$(-3-8i) - (2-9i)$

$-3-8i-2+9i$

$-5+i$

$(i+1) + (4-3i)$

$i+1+4-3i$

$5-2i$

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

$-10-6i-5i-3i^2$ ($i^2 = -1$)

$-10-11i+3$

$-7-11i$

$(6-4i)(5-4i)$

$30-24i-20i+16i^2$ ($i^2 = -1$)

$30-44i-16$

$14-44i$

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Complex Conjugate

$a+bi \rightarrow$ conjugate $a-bi$

$6+i \rightarrow 6-i$

$-2-3i \rightarrow -2+3i$

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Write in standard form ($a+bi$): $\frac{2+5i}{2-3i}$

$\frac{(2+5i)(2+3i)}{(2-3i)(2+3i)}$

$\frac{4+6i+10i+15i^2}{4+6i-6i-9i^2}$ $\quad 15i^2 \to -15$, $\quad -9i^2 \to +9$

$= \frac{-11+16i}{13}$

$= -\frac{11}{13} + \frac{16i}{13}$

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

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

$\frac{6-3i-8i+4i^2}{4+2i-2i-i^2}$ $\quad 4i^2 \to -4$, $\quad -i^2 \to +1$

$= \frac{2-11i}{5} = \frac{2}{5} - \frac{11i}{5}$

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