3/11/2022

WeBWorkSet: Complex Numbers

#7) $\frac{7-5i}{-3+4i}$

Note: Multiply num + den. by complex conjugate $-3-4i$

$i^2 = -1$

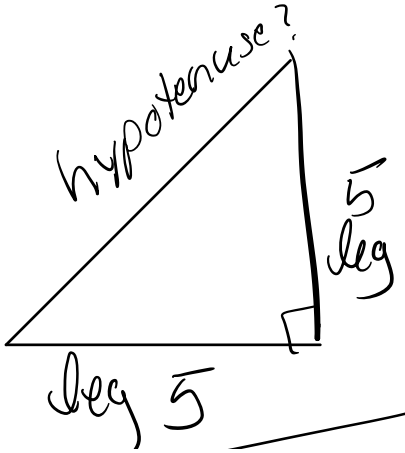
$$\frac{(7-5i)\cdot(-3-4i)}{(-3+4i)(-3-4i)} = \frac{-21-28i+15i+20i^2}{9-16i^2}$$

$$= \frac{-21-13i-20}{9+16} = \frac{-41-13i}{25}$$

a+bi form: $= \frac{-41}{25} - \frac{13}{25}i$

The complex conjugate of $a+bi$ is $a-bi$ and of $a-bi$ is $a+bi$.

Last class:



Pythagorean Theorem:

$leg^2 + leg^2 = hyp^2$

$5^2 + 5^2 = hyp^2$

$25+25=hyp^2$

$50=hyp^2$

To solve this, we used the "Square Root Property" which allows us to take the square root of both sides of the equation. BUT since we are looking for a length, this can only be positive, we only consider the positive square root $\rightarrow$

$50=hyp^2$

$+\sqrt{50}=hyp$

Class Agenda 16: Using the square root property and completing the square to solve quadratic equations.

Square Root Property:

If b is a real number and if $a^2 = b$ then $a = \pm\sqrt{b}$.

Ex Solve $\frac{2x^2}{2} = \frac{14}{2}$ ← First divide by 2

$$x^2 = 7$$

$$\boxed{x = \pm\sqrt{7}}$$

Ex Solve $(x+1)^2 = 12$ ← use the square root property

$$x+1 = \pm\sqrt{12}$$

means ↙ and ↘

$$x+1 = \sqrt{12} \qquad x+1 = -\sqrt{12}$$

$-1 \quad -1 \qquad -1 \quad -1$

$$\boxed{x = -1+\sqrt{12}} \qquad \boxed{x = -1-\sqrt{12}}$$

or can say: $\boxed{x = -1 \pm \sqrt{12}}$

Ex Solve $(2x-5)^2 = -16$

$2x-5 = \pm\sqrt{-16}$

$\sqrt{-16} = \sqrt{-1 \cdot 16}$

$\sqrt{-1} \cdot \sqrt{16}$

$= i \cdot 4 = 4i$

$2x-5 = +\sqrt{-16}$

$+5 \quad +5$

$\frac{2x}{2} = \frac{5+4i}{2}$

$x = \frac{5}{2} + 2i$

$2x-5 = -\sqrt{-16}$

$+5 \quad +5$

$\frac{2x}{2} = \frac{5-4i}{2}$

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

Note: These are complex conjugates!

Ex Solve $(3x-1)^2 = -4$ → Note:

Solution

$x = \frac{1}{3} - \frac{2}{3}i, \; x = \frac{1}{3} + \frac{2}{3}i$

Solve by "Completing the Square"

Ex Solve $p^2 + 2p = 4$

$ax^2 + bx = c$

Take the coefficient b and dividing it by 2 → then squaring the result and adding that value to both sides of the equation.

$b = 2 \rightarrow$ divide by 2 $\frac{2}{2} = 1 \rightarrow$ square it $1^2 = 1$

$p^2 + 2p = 4$

$p^2 + 2p + 1 = 4 + 1$

$(p+1)(p+1) = 5$

$(p+1)^2 = 5$ ← Now we can use the square root property to solve it!

$p + 1 = \pm\sqrt{5}$

$\boxed{p = -1 \pm \sqrt{5}}$

Ex Solve $x^2 + 8x = 1$ by completing the square.

$x^2+8x+16=1+16$

$(x+4)^2=17$ square root prop

$x+4=\pm\sqrt{17}$

$\boxed{x=-4\pm\sqrt{17}}$

Solve $m^2-7m-1=0$

$+1 \quad +1$

step 1

$m^2-7m=1$

$m^2-7m+12.25=1+12.25$

$(m-3.5)^2=13.25$

$m-3.5=\pm\sqrt{13.25}$

$\boxed{m=3.5\pm\sqrt{13.25}}$