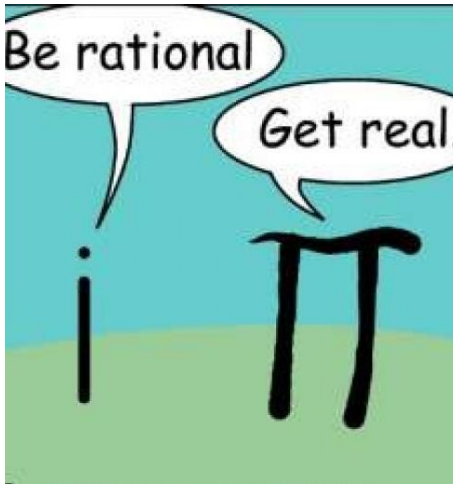
M314 Algebra II
Day 3
March 8th, 2010

Section 7-7 AND 7-9:

Imaginary and Complex Numbers



Presented by,

Mr. Kruczinski

REVIEW

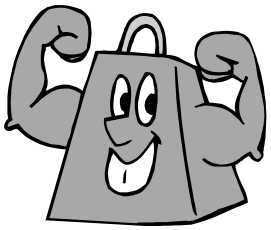
- ON THE TOP OF YOUR NOTE SHEET

❖$\sqrt{-1}$ = i

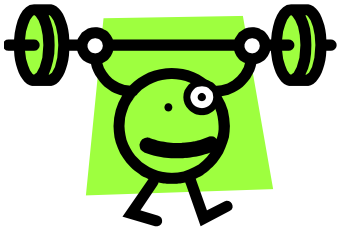
❖i^2 = -1

❖i^3 = $-i$

❖i^4 = 1



Warm-up (#1 and #2)



Do the indicated operation:

1) i^{51}

$$4\overline{)51} \quad 12$$

-4

11

-8

3

remainder 3

$\therefore i^3 = \boxed{-i}$

2) $\sqrt{-68}$

$\sqrt{-1 \cdot 68}$

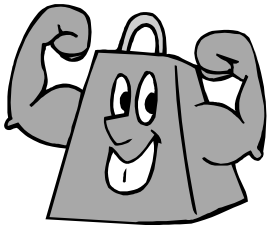
$\sqrt{-1} \cdot \sqrt{68}$

$68 = 2 \cdot 34$

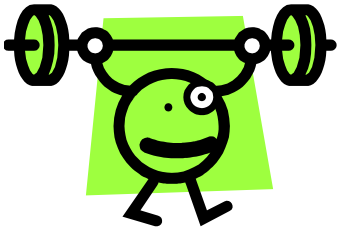
$34 = 2 \cdot 17$

$i \cdot 2 \cdot \sqrt{17}$

$\boxed{2\sqrt{17} \cdot i}$



Warm-up (#3)



3) $\sqrt{-7} * \sqrt{-3}$

$\sqrt{7} \cdot i \cdot \sqrt{3} \cdot i$

$\sqrt{7} \cdot \sqrt{3} \cdot i \cdot i$

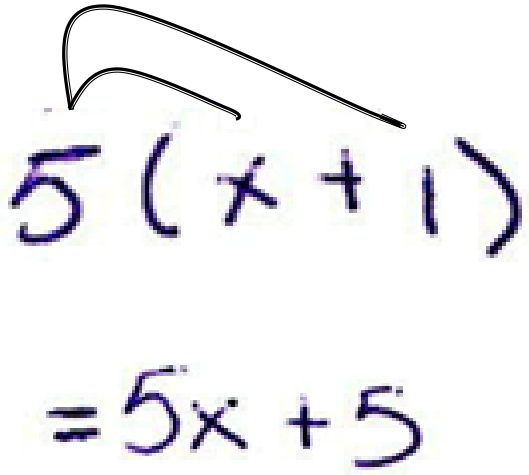
$\sqrt{21} \cdot i^2$

$\sqrt{21} \cdot (-1)$

$-\sqrt{21}$

Multiplying Complex numbers

RECALL: DISTRIBUTE!!!



Example #1

1.) $3i(1+6i)$

$(3i)(1)+(3i)(6i)$

$3i+(3\cdot 6\cdot i\cdot i)$

$3i+18\cdot i^2$

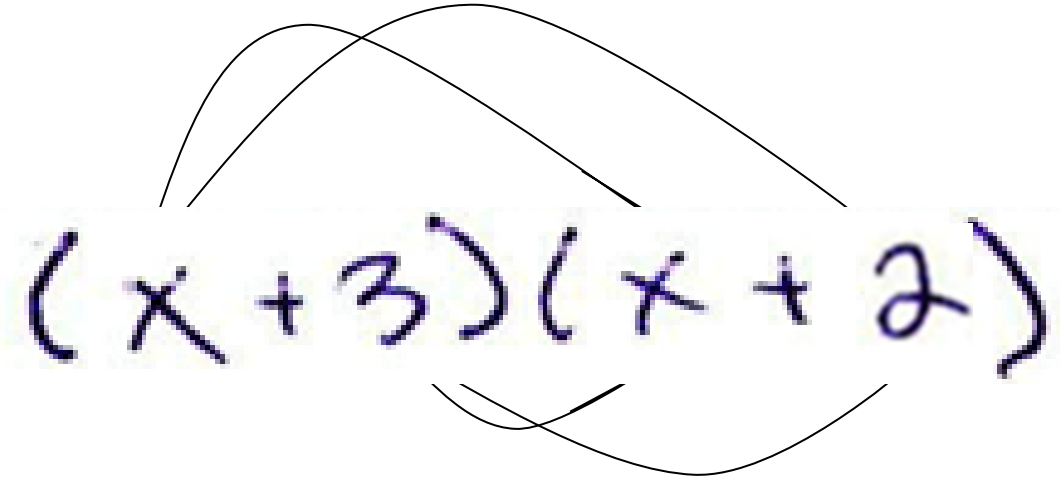
$3i+18(-1)$

$3i-18$

$-18+3i$

$a=-18 \quad b=3$

RECALL: "FOIL"ing



$= x^2 + 2x + 3x + 6$

$= x^2 + 5x + 6$

EXAMPLE #2

2.) $(1+i)*(2+3i)$

$= (1)(2)+(1)(3i)+(i)(2)+(i)(3i)$

$= 2+3i+2i+3i^2$

$= 2+5i+3(-1)$

$= 2+5i-3$

$= -1+5i$

$a = -1 \quad b = 5$

Complex Conjugates:

Definition:

- The conjugate of "a+bi" is "a-bi"

- The conjugate of "a-bi" is "a+bi"

EXAMPLE:

- The conjugate of "5+6i" is "5-6i"

EXAMPLES:

Write the conjugate of the following…

1) 10+8i

10-8i

2) 6-7i

6+7i

3) 9+6i

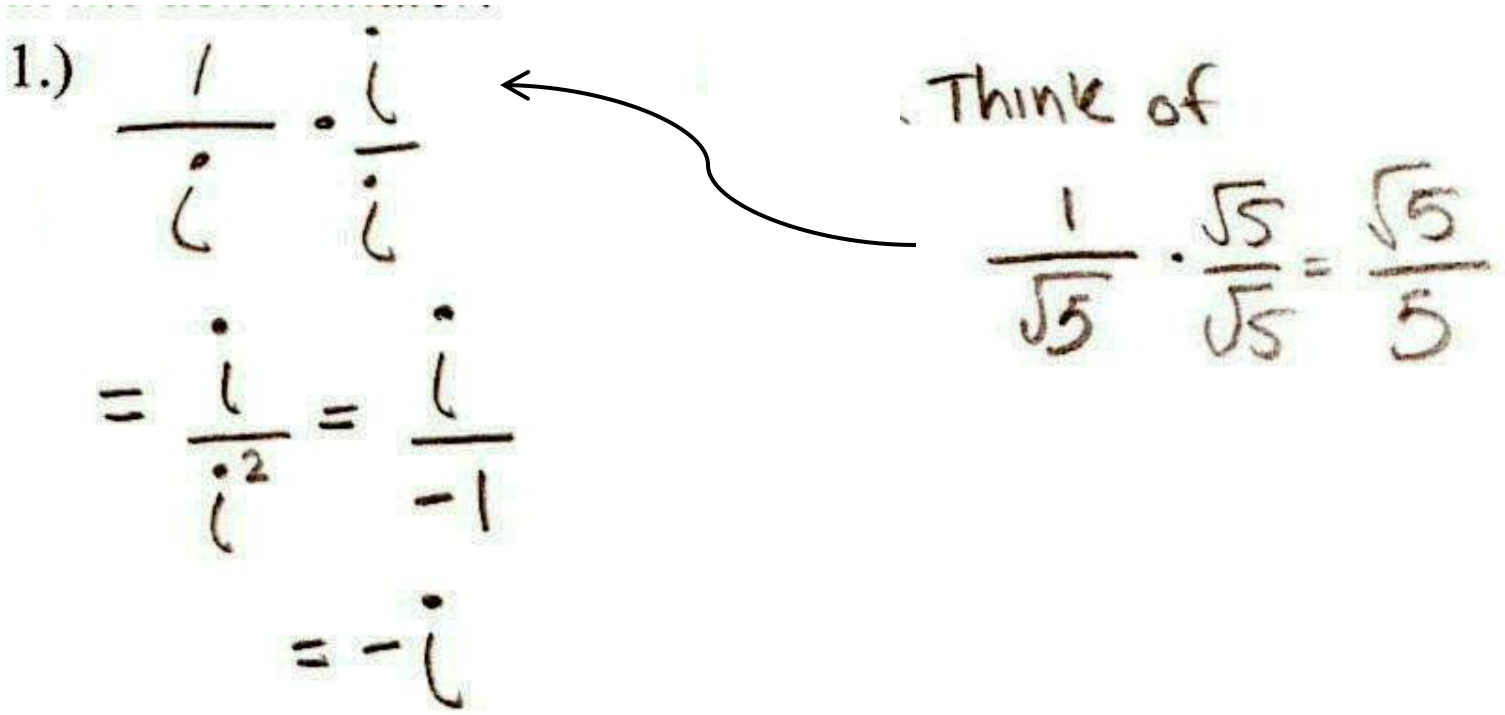
9-6i

4) 8-3i

8+3i

Division and Reciprocals:

- *For Complex numbers, we do not like having imaginary numbers in the denominator.*



Example # 2

2.) $\frac{3}{2i} \cdot \frac{i}{i}$

$= \frac{3i}{2i^2} = \frac{3i}{2(-1)}$

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

THINGS TO CONSIDER

Remember the difference of perfect squares…

$$(x+2)(x-2)$$

The same can be said about complex numbers

$$(2-6i)(2+6i) = (2)^2 - (6i)^2 = 4 - 36i^2 = 4 - 36(-1) = 4 + 36 = \boxed{40}$$

Example #3

3.) $\frac{1}{(1+i)} \cdot \frac{(1-i)}{(1-i)}$

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

$= \frac{1-i}{1-(-1)}$

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

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