Questions from homework....

5d)
$$\frac{x^2-2x+1}{x^2-1} = \frac{3x-1}{x+2}$$

$$\frac{(x-1)\cancel{(x-1)}}{(x+1)\cancel{(x-1)}} = \frac{3x-1}{x+2}$$

$$(x-1)(x+2) = (x+1)(3x-1)$$

$$x^2+x-2 = 3x^2+2x-1$$

$$0 = 2x^2+x+1$$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

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

$$x = \frac{-1 \pm \sqrt{1-8}}{4}$$

$$x = \frac{-1 \pm \boxed{\sqrt{-7}}}{4} \rightarrow$$

$\sqrt{7} \cdot \sqrt{-1}$

$\sqrt{7} \cdot i$

$i\sqrt{7}$

$$x = \frac{-1 \pm i\sqrt{7}}{4}$$

$$x = \frac{-1}{4} \pm \frac{i\sqrt{7}}{4}$$

$a = \frac{-1}{4}$ $\quad$ $b = \pm\frac{\sqrt{7}}{4}$

Consider the following!

Perform the indicated operations given

$z_1 = (4+8i)$ and $z_2 = (-3-i)$

$z_1 + z_2$

$4+8i+(-3-i)$

$\boxed{1+7i}$

$z_1 - z_2$

$4+8i-(-3-i)$

$4+8i+3+i$

$\boxed{7+9i}$

$z_1 \bullet z_2$

$(4+8i)(-3-i)$

$-12-28i-8(i^2)$

$-12-28i+8$

$\boxed{-4-28i}$

$\dfrac{z_1}{z_2}$

$\dfrac{(4+8i)(-3+i)}{(-3-i)(-3+i)}$

$\dfrac{-12-20i+8(i^2)}{9-(i^2)}$

$\dfrac{-12-20i-8}{9+1}$

$\dfrac{-20-20i}{10}$

$\boxed{-2-2i}$

We already now that the complex conjugate of a complex number **"a + bi"** is equal to **"a - bi"**

We can also say that for any complex number **"z"** the complex conjugate is equal to $\bar{z}$ → means complex conjugate

If z = 2 + 5i, calculate $\boxed{\bar{z} = 2-5i}$

$z + \bar{z}$

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

$\boxed{4}$

$z - \bar{z}$

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

$2+5i-2+5i$

$\boxed{10i}$

$z \bullet \bar{z}$

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

$4-25(i^2)$

$4+25$

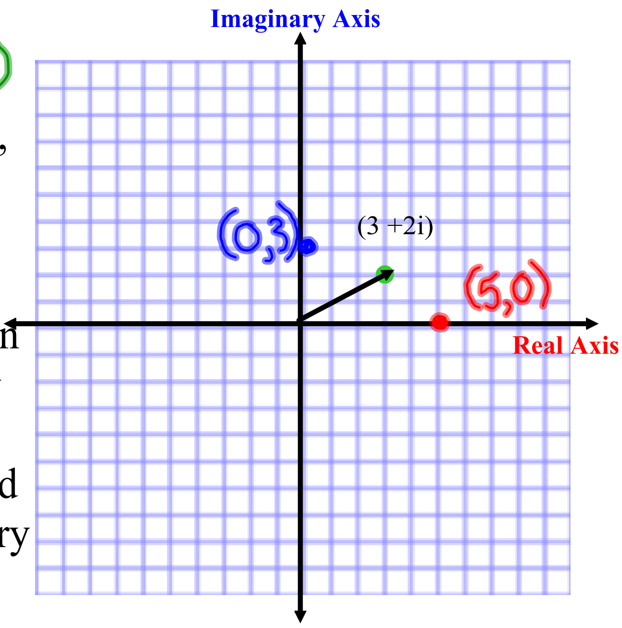
$\boxed{29}$

The Argand Plane / Complex Plane

Complex numbers can be represented geometrically in the complex plane, often called the Argand plane after Jean R. Argand who gave the representation in 1806. plot (a,b)

(3, 2)

The complex number $\boxed{3 + 2i}$ is represented by the directed line segment, or vector, from the origin to the point (3, 2). The horizontal axis is the ***real axis,*** and the vertical axis is the ***imaginary axis.*** Real numbers, such as 5 are written in the form $\boxed{5 + 0i}$ and are represented by points on the real axis. Pure imaginary numbers such as 3i, are written $\boxed{0 + 3i}$ and are represented by points on the imaginary axis



Graph the following:

$3-4i$ (3,-4)

a=3
b=-4

$\sqrt{-16}$ (0,4)

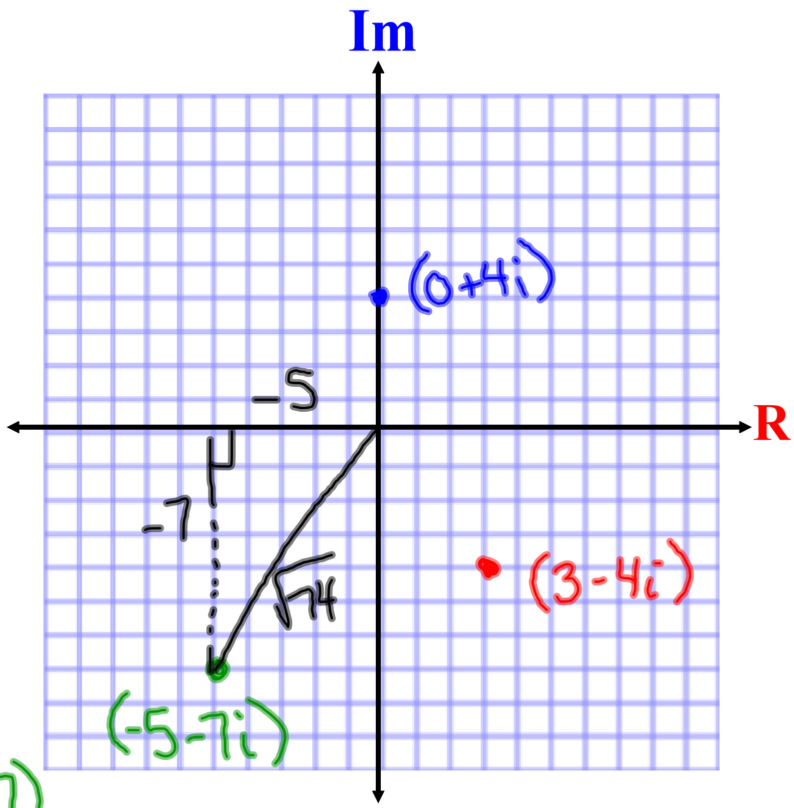
0+4i

a=0
b=4

$-5-\sqrt{-49}$ (-5,-7)

-5-7i

a=-5
b=-7



Modulus

The modulus is the absolute value of any complex number **"z"**. It is defined as the distance between the origin and the point "z" on the Argand Plane. It can be written as $\rightarrow |z|$

Calculating the **"modulus"** $|z| = \sqrt{a^2 + b^2}$

Ex.

$4 + 3i$

$a = 4$

$b = 3$

$|z| = \sqrt{a^2 + b^2}$

$= \sqrt{(4)^2 + (3)^2}$

$= \sqrt{16 + 9}$

$= \sqrt{25}$

$= 5$

$-5 - \sqrt{-49}$

$-5 - 7i \quad (-5, -7)$

$a = -5$

$b = -7$

$|z| = \sqrt{a^2 + b^2}$

$= \sqrt{(-5)^2 + (-7)^2}$

$= \sqrt{25 + 49}$

$\boxed{= \sqrt{74}}$

Homework

① a) $\sqrt{-50} + \sqrt{-98} - \sqrt{-242}$

$(\sqrt{50} \cdot \sqrt{-1}) + (\sqrt{98} \cdot \sqrt{-1}) - (\sqrt{242} \cdot \sqrt{-1})$

$5i\sqrt{2} + 7i\sqrt{2} - 11i\sqrt{2}$

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