Complex Numbers

$$i = \sqrt{-1} \qquad i^2 = -1 \qquad \sqrt{-a} = i\sqrt{a}, \ a \geq 0$$

$$(a+bi)+(c+di) = a+c+(b+d)i$$

$$(a+bi)-(c+di) = a-c+(b-d)i$$

$$(a+bi)(c+di) = ac-bd+(ad+bc)i$$

$$(a+bi)(a-bi) = a^2+b^2$$

$$|a+bi| = \sqrt{a^2+b^2} \quad \text{Complex Modulus}$$

$$\overline{(a+bi)} = a-bi \qquad \text{Complex Conjugate}$$

$$\overline{(a+bi)}(a+bi) = |a+bi|^2$$