Review of Complex Numbers

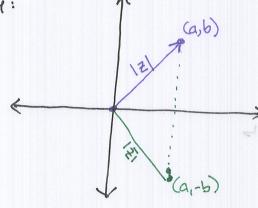
Z= a+bi, a,b EIR

a= Re(z) - the real part of z, b= Im(z) - the imaginary part of z.

12 = Ja2+62 (the magnitude or norm of z)

= a = bi (the conjugate of z)

Geometrically: Z is the vector from the origin to (a, b)



* Z+Z and ZZ E R

THE

* 12 is the length of the segment from (0,0) to (a,5)

= a(x*+ きx*意

= +(x) = ax + bx+c

* Z is a reflection of Z in the x-aws (EK) 3 (x) = 62x -

$$* z + \overline{z} = (a+bi) + (a-bi)$$

$$= 2a$$

$$= 2 Re(z)$$

$$\begin{array}{l}
* Z \cdot \overline{Z} = (a+bi)(a-bi) \\
= a^2 - b^2 i^2 \quad (i^2 = -1) \\
= a^2 + b^2
\end{array}$$

$$= |Z|^2$$

let z, = a,+b,i 8 === az+bzi => == a,-b,i, =z = az-bzi

Z1+Z2 = (a1+a2)+(b1+b2)i

= (a,+az)-(b,+bz)i

= (a,-b,i) + (az-bzi)

2,+22= (a,+a2) + (b,+b2)i

: X= 5-i, -5-i

3-3-5-5

P+9+ E

さっせて= (a, az - b, bz) + (a, bzを+ az ら)に

Find the routs of

(The conjugate of a sun is the sun of the conjugates)

ET 22 (a to 1) - (a to 1 a 2 to) i

₹, ₹2 = (a, a2 - b, b2) * (a, b2 + a2b) i

= a, az-b, bz-a, bzi-azbii st prizo olo Sz-xitixs = (2) site .

= a, (az-bzi) - b, i(az-bzi)

= (a,-b,i)(az-bzi)

= 7,0 72

0=58-x34+5x5

(The canjugate of a product is the product of the conjugates)

Quadratic Equations and Roots

f(x) = ax2+bx+c.

roots of f(x)=0 are 1,852

=) f(x) = ax2+bx+c = a(x+ = x+ =) = a(x-r,)(x-r2) = a(x2-(ri+re)x+ris2)

Equate Coefficients:

(5 to men a sboth son $a = r_1 r_2$ = r_1 = r_2 = r_3 = r_4 =

Ex: g(x)= 2x2-9x+17.

The roots of g(x) -ace a are a & 5 * 2+2 = Carbi

= 2 Re(B)

· Find a2+b3

Find
$$a^2 + b^2$$
:

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

= $(\frac{a}{2})^2 - 2(\frac{12}{2})$

= $\frac{81}{4} - 17$

* 2+2 and 22 6 R.

813 d, D, 184 D = 5

Geometrically:

Is the rector

from the origin

1355

let 3, = a,+b, i 8 3,= a,+b2 i => 3, = a,-b, i, 5, = az-bz i 2(+3) = (a,+a2) + (b,+b2) E

· Find (a+2)(b+2) w/o finding a 86

=> (a+2)(b+2)= ab+2(a+b)+4

$$= \frac{17}{2} + 9 + 4$$

$$= \frac{17}{2} + 13$$

$$= \frac{43}{2}$$

Find the routs of

· Solve P(x) = 2x2+4ix-52 w/o using the quadratic formula = a, (az-bzi) - b, i (az -bzi)

=> X2+2ix-26=0 Complete the Square

=> (x2+2ix-1)+1-26=0 (The conjugate of a product is the product of the conjugates

 $=7(x+i)^2=25$

=7 X+i= ±5

= (co+10) - (b+10) 0 cos) =

= (a,-b,i) + (a, -bzi) 3 + 3 =

(The conjugate of a sum is the sum of the conjugates) (21+ 71 =

(3,d-,D)(3,d-,D)=

16, 2 (x, e 6 d) = (a, b, a) = 3 3 5 (35 = (a,a, + b, b) # (3d, b + 4 a, b) = 35,5