Analisis Kompleks / Pertemuan ke-1 / Catatan

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Complex Variables
and Applications

Bilangan Kompleks

- Bilangan Kompleks
  - Real
    - Irasional
    - Rasional
      - Bulat
        - Bulat negatif
        - Cacah
          - Nol
          - Asli
            - Satu
            - Prima
            - Komposit
      - Pecahan
  - Imaginer

Bilangan kompleks

$\mathbb{C} = \{ a + bi \mid a, b \in \mathbb{R} \}$

didefinisikan $\sqrt{-1} = i$, $i^2 = -1$

$3 \in \mathbb{C} \longrightarrow 3 = 3 + 0i$

$0 \in \mathbb{C} \longrightarrow 0 = 0 + 0i$

$z = a + bi \in \mathbb{C}$ — $\mathrm{Re}(z) = a$, $\mathrm{Im}(z) = b$

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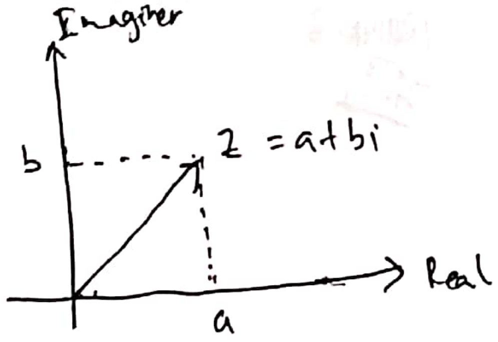

$z = a+bi$

komp. real

$\hookrightarrow z = (a,b)$

komp. imaginer

Operasi Bilangan Kompleks

Misal $z_1 = a+bi \in \mathbb{C} \xrightarrow{\text{dapat ditulis}} z_1 = (a,b)$ → disebut pasangan terurut

$z_2 = c+di \in \mathbb{C} \xrightarrow{\text{dapat ditulis}} z_2 = (c,d)$ → disebut pasangan terurut

(1) Penjumlahan / pengurangan

$z_1 + z_2 = (a+bi) + (c+di)$
$= (a+c) + (b+d)i$

saat dipandang sebagai pasangan terurut
$z_1 + z_2 = (a,b) + (c,d)$
$= (a+c, b+d)$

$z_1 - z_2 = (a+bi) - (c+di)$
$= (a-c) + (b-d)i$

$z_1 - z_2 = (a,b) - (c,d)$
$= (a-c, b-d)$

$\boxed{E}$

$z_1 = 3+2i$
$z_2 = 5+7i$
$z_1 + z_2 = 8+9i$
$z_1 - z_2 = -2-5i$

(2) Perkalian

$z_1 z_2 = (a+bi).(c+di)$
$= ac + (ad)i + (bc)i - bd$
$= (ac-bd) + (ad+bc)i$

$z_1 z_2 = (a,b)(c,d)$
$= (ac-bd, ad+bc)$

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Maret

3. Pembagian

$z_1 = a + bi$

$z_2 = c + di \neq 0$

$$\frac{z_1}{z_2} = \frac{a+bi}{c+di} \times \frac{c-di}{c-di}$$

$$= \frac{ac - (ad)i + (bc)i + bd}{c^2 + d^2}$$

$$= \frac{(ac+bd)}{c^2+d^2} + \frac{(bc - ad)i}{c^2+d^2}$$

$$= \left(\frac{ac+bd}{c^2+d^2}\right) + \left(\frac{bc-ad}{c^2+d^2}\right)i$$

Konjugat / Sekawan

konjugat bilangan kompleks $z = a + bi$ ditulis $\bar{z} = a - bi$