

۱۳۱، ۱۳۱

جلسه هفتم^{۱۰۰}

مجموعه اعداد مختلط^{۱۰۰}

عدد مختلط^{۱۰۰} z برابر با دو عدد حقیقی x و y است که $z = x + iy$

برای تعریف می شود

$$z = x + iy$$

$$\square + \square i$$

$$y + xi$$

$$-1 + 10i$$

$$-7 - 3i$$

$$\frac{2}{3} + \frac{5}{2}i$$

$Re z$ قسمت حقیقی

$Im z$ قسمت موهومی

اعمال جمع / تفریق / ضرب / تقسیم در مجموعه اعداد مختلط^{۱۰۰}

$$z_1 = a_1 + iy_1$$

$$z_2 = a_2 + iy_2$$

$$z_1 + z_2 = (a_1 + a_2) + i(y_1 + y_2)$$

$$z_1 - z_2 = (a_1 - a_2) + i(y_1 - y_2)$$

$$z_1 z_r = (a_1 a_r - y_1 y_r) + i (y_1 a_r + a_1 y_r)$$

$$\begin{array}{cc} a_1 & y_1 \\ \downarrow & \downarrow \\ a_r & y_r \end{array}$$

$$\frac{z_1}{z_r} = \left(\frac{a_1 a_r + y_1 y_r}{a_r^2 + y_r^2} \right) + i \left(\frac{y_1 a_r - a_1 y_r}{a_r^2 + y_r^2} \right)$$

$$\begin{array}{cc} a_1 & y_1 \\ \downarrow & \downarrow \\ a_r & y_r \end{array}$$

$$\left. \begin{array}{l} \gamma + \mu = 9 \\ -\gamma - \mu = -9 \\ -\gamma + \mu = -\mu \\ \gamma - \mu = \mu \end{array} \right\}$$

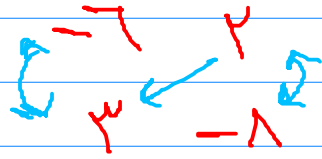
$$z_1 = -7 + 4i \quad z_r = 4 - 11i$$

$$\begin{aligned} z_1 + z_r &= (-7 + 4) + i(4 - 11) \\ &= -3 - 7i \end{aligned}$$

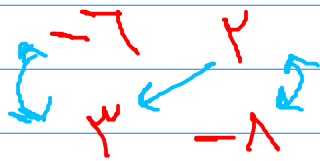
$$\begin{aligned} z_1 - z_r &= (-7 - 4) + (4 - (-11))i \\ &= -11 + 15i \end{aligned}$$

$$z_1 z_2 = (-11 - (-14)) + i(4 + 41)$$

$$= -2 + 45i$$

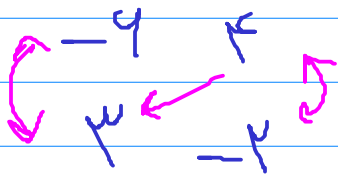


$$\frac{z_1}{z_2} = \left(\frac{-11 - 14}{\sqrt{17} + (-1)\sqrt{17}} \right) + i \left(\frac{4 - 41}{\sqrt{17} + (-1)\sqrt{17}} \right)$$



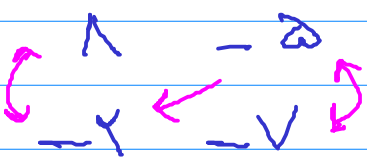
$$= \frac{-25}{\sqrt{17}} + i \frac{(-37)}{\sqrt{17}}$$

$$(-7 + 5i)(2 - 2i) = (-11 - (-1)) + i(14 + 10)$$



$$= -10 + 24i$$

$$\frac{1 - 2i}{-2 - 5i} = \left(\frac{-17 + 10}{2 + 19} \right) + i \left(\frac{10 - (-24)}{2 + 19} \right)$$



$$= \frac{19}{21} + \frac{34}{21}i$$