# 6.40

måndag 19 december 2022 16:30

$$(2+i)z^2+(1-7i)z-5=0$$

$$z^2+\frac{(1-7i)}{(2+i)}z-\frac{5}{(2+i)}=0$$

$$\frac{1-7i}{2+i}=\frac{(1-7i)(2-i)}{5}=\frac{2-i-14i-7}{5}=\frac{-5-15i}{5}=-1-3i$$

$$\frac{5}{(2+i)}=\frac{10-5i}{5}=2-i$$

$$z^2+(-1-3i)z-2+i=0 \Leftrightarrow \left(\underbrace{z-\frac{(1+3i)}{2}}_{w}\right)^2=\left(\frac{1+3i}{2}\right)^2+2-i \Leftrightarrow$$

$$\Leftrightarrow w^2=\frac{1-9+6i}{4}+2-i \Leftrightarrow w^2=\frac{-8+6i}{4}+2-i \Leftrightarrow$$

$$w^2=\frac{-8+6i+8-4i}{4}=\frac{1}{2}i$$

$w^2=1/2\,i$

$w=a+bi$ $\qquad |w^2|=|w|^2=\sqrt{\frac{1}{4}}=\frac{1}{2}$ ($|w|^2=a^2+b^2$)

$a^2-b^2+2abi=1/2\,i$

$a^2-b^2=0$ $\qquad 2a^2=1/2$ $\quad a=\pm 1/2$ $\quad b=\pm 1/2$

$a^2+b^2=1/2$

$2ab=1/2$

$$w_1=z_1-\frac{(1+3i)}{2}=\frac{1}{2}+\frac{1}{2}i$$

$$z_1=\frac{1}{2}+\frac{1}{2}i+\frac{1}{2}+\frac{3}{2}i=1+2i$$

$$w_2=z_2-\frac{(1+3i)}{2}=-\frac{1}{2}-\frac{1}{2}i$$

$$z_2=-\frac{1}{2}-\frac{1}{2}i+\frac{1}{2}+\frac{3}{2}i=i$$

Sv: $z_1=1+2i$ , $z_2=i$