EXERCÍCIOS

1.RESOLVA

Considere os números complexos $z = 2 - 3i$ e $t = \dfrac{1}{2+i}$.

Represente na forma algébrica t, z^2 e $(1-i).\overline{z}$

$$t = \frac{1}{2+i} = \frac{2-i}{(2+i)(2-i)} = \frac{2-i}{2^2-i^2} = \frac{2-i}{4-(-1)} = \frac{2-i}{5} = \frac{2}{5} - \frac{1}{5}i$$

$$z^2 = (2-3i)^2 = 4 - 12i + 9i^2 = 4 - 12i + 9(-1) = 4 - 12i - 9 = -5 - 12i$$

$$(1-i)\overline{z} = (1-i)(2+3i) = 2 + 3i - 2i - 3i^2 =$$
$$= 2 + i - 3(-1) = 2 + i + 3 = 5 + i$$

2.RESOLVA

$2z - i = \overline{z}$ Seja $z = x + yi$.

$$2z - i = \overline{z} \Leftrightarrow 2(x+yi) - i = x - yi \Leftrightarrow 2x + 2yi - i = x - yi \Leftrightarrow$$

$$\Leftrightarrow 2x + (2y-1)i = x - yi \Leftrightarrow$$

$$\Leftrightarrow \begin{cases} 2x = x \\ 2y - 1 = -y \end{cases} \Leftrightarrow \begin{cases} x = 0 \\ 3y = 1 \end{cases} \Leftrightarrow \begin{cases} x = 0 \\ y = \frac{1}{3} \end{cases}$$

$$S = \left\{ \frac{1}{3}i \right\}$$

3 RESOLVA

$$z^2 + z = -1$$

$$z^2 + z = -1 \Leftrightarrow z^2 + z + 1 = 0 \Leftrightarrow$$

$$\Leftrightarrow z = \frac{-1 \pm \sqrt{1^2 - 4 \times 1 \times 1}}{2 \times 1} \Leftrightarrow z = \frac{-1 \pm \sqrt{-3}}{2} \Leftrightarrow$$

$$\Leftrightarrow z = \frac{-1 \pm \sqrt{3}i}{2}$$

$$z_1 = -\frac{1}{2} - \frac{\sqrt{3}}{2}i \quad \text{e} \quad z_2 = -\frac{1}{2} + \frac{\sqrt{3}}{2}i$$

$$S = \left\{ -\frac{1}{2} - \frac{\sqrt{3}}{2}i, -\frac{1}{2} + \frac{\sqrt{3}}{2}i \right\}$$

4.RESOLVA

$$z^3 + 2z = 0$$

$$z^3 + 2z = 0 \Leftrightarrow z\left(z^2 + 2\right) = 0 \Leftrightarrow z = 0 \vee z^2 + 2 = 0 \Leftrightarrow z = 0 \vee z^2 = -2 \Leftrightarrow$$

$$\Leftrightarrow z = 0 \vee z = \pm\sqrt{-2} \Leftrightarrow z = 0 \vee z = \pm\sqrt{2}i$$

$$S = \left\{ -\sqrt{2}i, 0, \sqrt{2}i \right\}$$