

Prelembromos:

$$i^0 = 1$$

$$i^3 = -i$$

$$i^1 = i$$

$$i^4 = 1$$

$$i^2 = -1$$

$$i^5 = i$$

Calcule as potências:

$$1. \quad i^{27} = \begin{array}{r} 27 \quad | \quad 4 \\ \underline{24} \quad 6 \\ 3 \end{array} \quad \rightarrow \quad i^{27} = 1 \cdot i^3 = -i$$

$$2. \quad i^{48} = \begin{array}{r} 48 \quad | \quad 4 \\ \underline{4} \quad 12 \\ 08 \\ \underline{8} \\ 0 \end{array} \quad \text{resto} = 0$$

$$i^{48} = 1 \cdot i^0 = 1$$

$$3. \quad (-i)^{33} = \begin{array}{r} 33 \quad | \quad 4 \\ \underline{32} \quad 8 \\ 01 \end{array}$$

$$(-i)^{33} = i^{32} \cdot i^1 \cdot (-1)^{33} \rightarrow \text{resto}$$

$$(-1 \cdot i)^{33} = 1 \cdot i \cdot (-1)^{33} \rightarrow \text{exponente ímpar} \quad (-1)^{33} = -1$$

$$(-i)^{33} = -i$$

$$4. \quad (-i)^{23} = \begin{array}{r} 23 \quad | \quad 4 \\ \underline{20} \quad 5 \\ 3 \end{array}$$

$$(-1 \cdot i)^{23} = 1 \cdot i^3 \cdot (-1)^{23} \rightarrow (-1) \text{ elevado à um expoente ímpar} = -1$$

$$(-i)^{23} = -i \cdot (-1) = i$$

$$5. \quad (2i)^{10} = \begin{array}{r} 10 \quad | \quad 4 \\ \underline{8} \quad 8 \\ 2 \end{array}$$

$$(2i)^{10} = (2)^{10} \cdot (i)^{10}$$

$$(2i)^{10} = 1024 \cdot i^{4 \cdot 2} \cdot i^2$$

$$(2i)^{10} = 1024 \cdot (-1)$$

$$(2i)^{10} = -1024$$

$$6. \quad \left(\frac{i}{2}\right)^7 = \begin{array}{r} 7 \quad | \quad 4 \\ \underline{4} \quad 1 \\ 3 \end{array}$$

$$\left(\frac{i}{2}\right)^7 = \frac{i^3}{2^7}$$

$$\left(\frac{i}{2}\right)^7 = \frac{-i}{128}$$

$$7. \quad i^{-5} = \frac{i^5}{i^5} = \frac{1}{i^4 \cdot i^1} = \frac{1}{1 \cdot i} \cdot \left(\frac{-i}{-i}\right)$$

$$\frac{-i}{-i^2} = \frac{-i}{+1} = -i$$

$$(i)^{-5} = -i$$

$$8. \quad (-i)^{-4} = \frac{(-i)^4}{(-i)^4} = \frac{(-1)^4}{i^4} = \frac{1}{1}$$

$$(-i)^{-4} = 1$$

Calcule:

$$9. \quad 1 + 2i + 3i^2 + 4i^3 + 5i^4 =$$

$$1 + 2i + 3(-1) + 4(-i) + 5 \cdot 1 =$$

$$1 + 2i - 3 - 4i + 5 = 3 - 2i$$

$$10. \quad (-i)^6 - 3(-i)^4 + 5(-i)^3 =$$

$$(-1)^6 \cdot (i)^6 - 3 \cdot (-1)^4 \cdot (i)^4 + 5 \cdot (-1)^3 \cdot (i)^3$$

$$1 \cdot (-1) - 3 \cdot 1 \cdot 1 + 5 \cdot (-1) \cdot (-i)$$

$$-1 - 3 + 5i$$

$$-4 + 5i$$