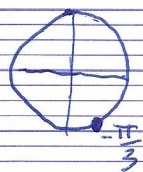


Exercice 25 page 245

1. $z_1 = -3e^{-i\frac{\pi}{3}}$



$$z_1 = -3\left(\cos\left(-\frac{\pi}{3}\right) + i\sin\left(-\frac{\pi}{3}\right)\right)$$

$$z_1 = -3\left(\frac{1}{2} + i\left(-\frac{\sqrt{3}}{2}\right)\right)$$

$$z_1 = -\frac{3}{2} + \frac{3\sqrt{3}}{2}i$$

⚠ 2. Attention $z_1 = -3e^{-i\frac{\pi}{3}}$ n'est pas sous forme exponentielle car -3 est négatif.

$$-3 = -1 \times 3$$

$$-3 = e^{i\pi} \times 3$$

$$-3 = 3e^{i\pi}$$

$$\text{car } e^{i\pi} = -1$$

D'où $z_1 = \boxed{-3}e^{-i\frac{\pi}{3}}$

$$z_1 = \boxed{3e^{i\pi}}e^{-i\frac{\pi}{3}}$$

$$z_1 = 3e^{i\left(\pi - \frac{\pi}{3}\right)}$$

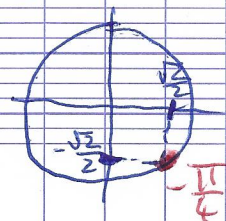
$$\boxed{z_1 = 3e^{i\frac{2\pi}{3}}}$$

• $z_2 = 2 - 2i$

$$\rightarrow |z_2| = \sqrt{2^2 + (-2)^2} = \sqrt{4 + 4} = \sqrt{8} = 2\sqrt{2}$$

$$\rightarrow \arg(2 - 2i) = \begin{cases} \cos \theta = \frac{2}{2\sqrt{2}} = \frac{\sqrt{2}}{2} \\ \sin \theta = \frac{-2}{2\sqrt{2}} = -\frac{\sqrt{2}}{2} \end{cases}$$

$$\Rightarrow \boxed{\theta = -\frac{\pi}{4}}$$



$$\text{donc } z_2 = 2\sqrt{2} e^{i(-\frac{\pi}{4})} \quad \boxed{z_2 = 2\sqrt{2} e^{-i\frac{\pi}{4}}}$$

$$z_1 z_2 = 3 e^{i\frac{2\pi}{3}} \times 2\sqrt{2} e^{-i\frac{\pi}{4}}$$

$$z_1 z_2 = 6\sqrt{2} e^{i(\frac{2\pi}{3} - \frac{\pi}{4})}$$

$$z_1 z_2 = 6\sqrt{2} e^{i(\frac{8\pi}{12} - \frac{3\pi}{12})}$$

$$\boxed{z_1 z_2 = 6\sqrt{2} e^{i\frac{5\pi}{12}}}$$

3.

$$z_1 z_2 = 6\sqrt{2} e^{i\frac{5\pi}{12}} = 6\sqrt{2} \left(\cos\left(\frac{5\pi}{12}\right) + i \sin\left(\frac{5\pi}{12}\right) \right)$$

$$* \quad z_1 z_2 = 6\sqrt{2} \cos\left(\frac{5\pi}{12}\right) + i 6\sqrt{2} \sin\left(\frac{5\pi}{12}\right)$$

$$\text{ce plus } z_1 z_2 = \left(-\frac{3}{2} + \frac{3\sqrt{3}}{2} i \right) (2 - 2i) \\ = -3 + 3i + 3\sqrt{3}i + 3\sqrt{3}$$

$$** \quad z_1 z_2 = \underline{-3 + 3\sqrt{3}} + i(3 + 3\sqrt{3})$$

$$* = ** \Rightarrow \begin{cases} 6\sqrt{2} \cos\left(\frac{5\pi}{12}\right) = -3 + 3\sqrt{3} \\ 6\sqrt{2} \sin\left(\frac{5\pi}{12}\right) = 3 + 3\sqrt{3} \end{cases}$$

$$\cos\left(\frac{5\pi}{12}\right) = \frac{-3 + 3\sqrt{3}}{6\sqrt{2}} = \frac{-1 + \sqrt{3}}{2\sqrt{2}} = \frac{-\sqrt{2} + \sqrt{6}}{4}$$

$$\sin\left(\frac{5\pi}{12}\right) = \frac{3 + 3\sqrt{3}}{6\sqrt{2}} = \frac{1 + \sqrt{3}}{2\sqrt{2}} = \frac{\sqrt{2} + \sqrt{6}}{4}$$

$$\boxed{\cos\left(\frac{5\pi}{12}\right) = \frac{\sqrt{6} - \sqrt{2}}{4}}$$

$$\boxed{\sin\left(\frac{5\pi}{12}\right) = \frac{\sqrt{6} + \sqrt{2}}{4}}$$