Exo2 :

1 _ posons $z = 1 + j$ $\quad j \neq i$

$|z| = \sqrt{1^2+1^2} \; ? = \sqrt{2}$ $\quad j = e^{i\frac{2\pi}{3}}$

$z = \sqrt{2}\left(\frac{1}{\sqrt{2}} + j\frac{1}{\sqrt{2}}\right)$ A reprendre.

$= \sqrt{2}\left(\frac{\sqrt{2}}{2} + j\frac{\sqrt{2}}{2}\right)$

$= \sqrt{2}\left(\cos\left(\frac{\pi}{4}\right) + j\sin\left(\frac{\pi}{4}\right)\right)$

$\boxed{z = \sqrt{2}\, e^{j\frac{\pi}{4}}}$

2 _ Soit $P(X) = (1+X^4)^n - X^n$

j racine de $P(X) \Leftrightarrow P(j) = 0$

$P(j) = (1+j^4)^n - j^n$

$\cancel{j^2 = -1}$

2 _ Soit $P(X) = (1 + X^4)^n - X^n$

j racine de $P(X) \Leftrightarrow P(j) = 0$

$$P(j) = (1 + j^4)^n - j^n$$

$$j^2 = -1$$

$$j^4 = 1$$

donc $P(j) = (1+1)^n - j^n$

$$P(j) = 0$$

$$\Leftrightarrow 2^n - j^n = 0$$

$$\Leftrightarrow 2^n = j^n \cancel{e^{j\frac{\pi}{2}n}}$$

pour $n = 0$

$2^0 = j^0 \Rightarrow 1 = 1$ ce qui est vrai

donc $P(j) = 0 \Leftrightarrow n = 0$