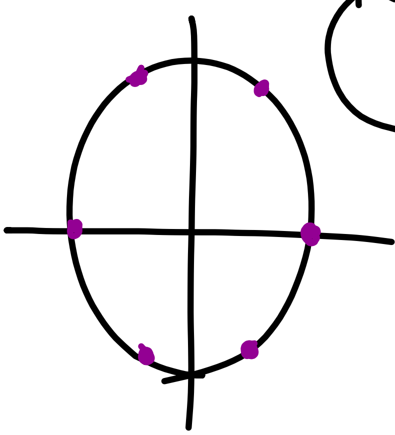
$$(r\,\mathrm{cis}\,\theta)^n = r^n\,\mathrm{cis}\,n\theta$$

$$= \left(re^{\theta i}\right)^n = r^n e^{n\theta i}$$

$$\sqrt[n]{r\,\mathrm{cis}\,\theta} = \sqrt[n]{r}\,\mathrm{cis}\left(\frac{\theta}{n} + \frac{2\pi k}{n}\right),\ k \in N^{\pm}$$

$$x^6 - 1$$

$$\left(\frac{1}{2}+\frac{\sqrt{3}}{2}i\right)\left(\frac{1}{2}-\frac{\sqrt{3}}{2}i\right) \qquad z_1 \cdot \bar{z}_1 = |z_1|^2$$



$$1 \longrightarrow (x-1)$$

$$\frac{1}{2} \pm \frac{\sqrt{3}}{2}i \rightarrow (x^2 - x + 1)$$

$$-\frac{1}{2} \pm \frac{\sqrt{3}}{2}i \rightarrow (x^2 + x + 1)$$

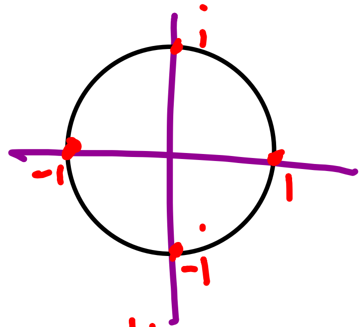
$$-1 \longrightarrow (x+1)$$

$$x^6 - 1 = (x-1)(x+1)(x^2+x+1)(x^2-x+1)$$

x^4-1 : factor

$x^4=1=1\,\text{cis}\,0$

$x_1=1\,\text{cis}\,0$



$1 \to (x-1)$

$\pm i \to (x^2+1)$ → $-(i)^2$ → 1

$-1 \to (x+1)$

$x^4-1=(x-1)(x+1)(x^2+1)$

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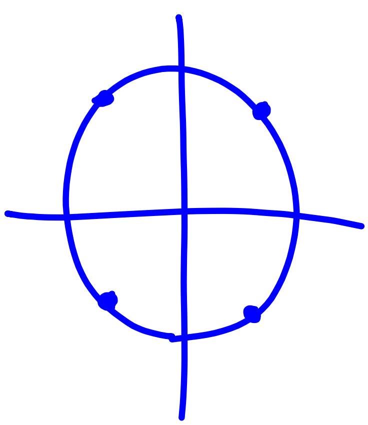
x^4+1



$x^4=-1$

$x_1=\sqrt[4]{1\,\text{cis}\,180^\circ}$

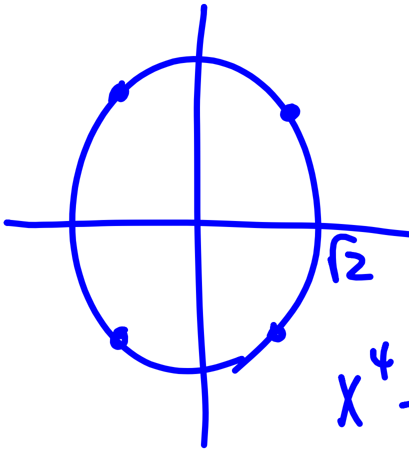
$=1\,\text{cis}\,45^\circ$

$\frac{\sqrt{2}}{2}\pm\frac{\sqrt{2}}{2}i \to (x^2-\sqrt{2}x+1)$

$-\frac{\sqrt{2}}{2}\pm\frac{\sqrt{2}}{2}i \to (x^2+\sqrt{2}x+1)$

$x^4 + 4$

$\sqrt{2}\left(\frac{\sqrt{2}}{2} \pm \frac{\sqrt{2}}{2} i\right)$



$1 \pm i \to x^2 - 2x + 2$

$-1 \pm i \to x^2 + 2x + 2$

$x^4 + 4 = (x^2 - 2x + 2)(x^2 + 2x + 2)$