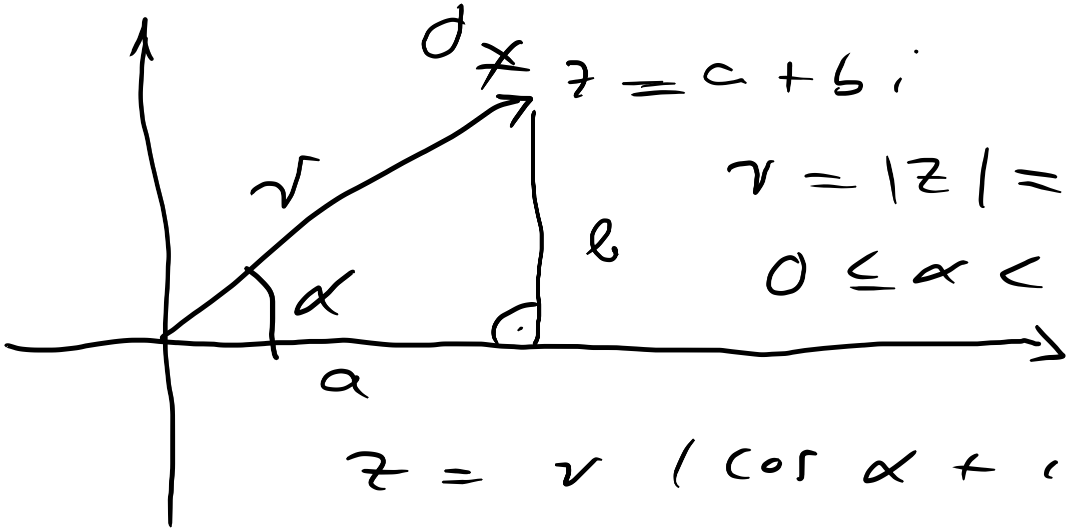


$z = a + bi$

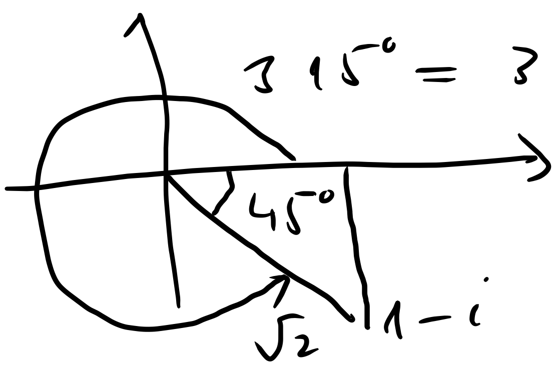
$r = |z| = \sqrt{a^2 + b^2}$

$0 \le \alpha < 360^\circ$

$z = r(\cos\alpha + i\sin\alpha)$ TRIG. ALAK.

1. Rajzold le
2. Hossz $z = \sqrt{Re(z)^2 + Im(z)^2}$.
3. Szög

$315^\circ = 360^\circ - 45^\circ$

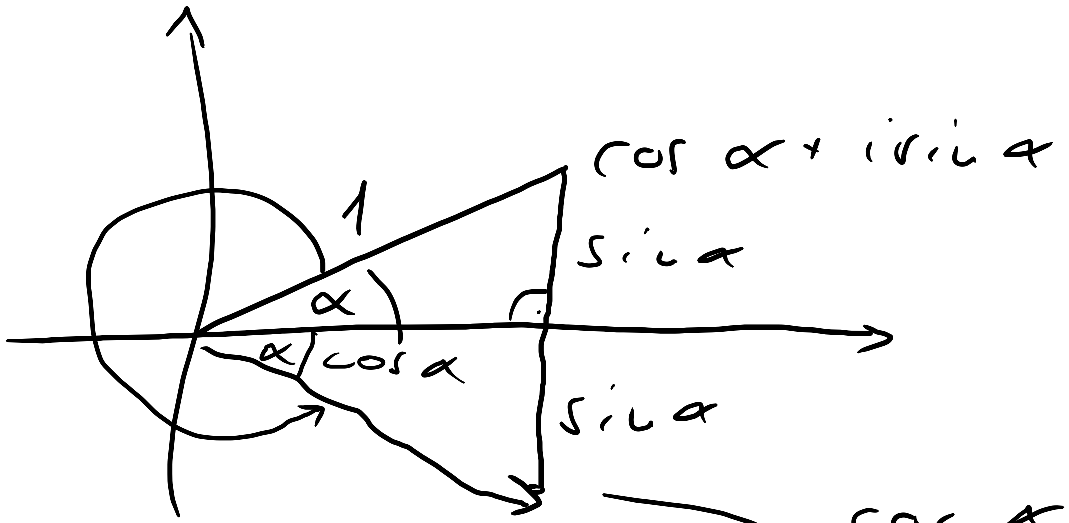


$1 - i = \sqrt{2}(\cos 315^\circ + i\sin 315^\circ) =$

$= \sqrt{2}(\cos(-45^\circ) + i\sin(-45^\circ))$.

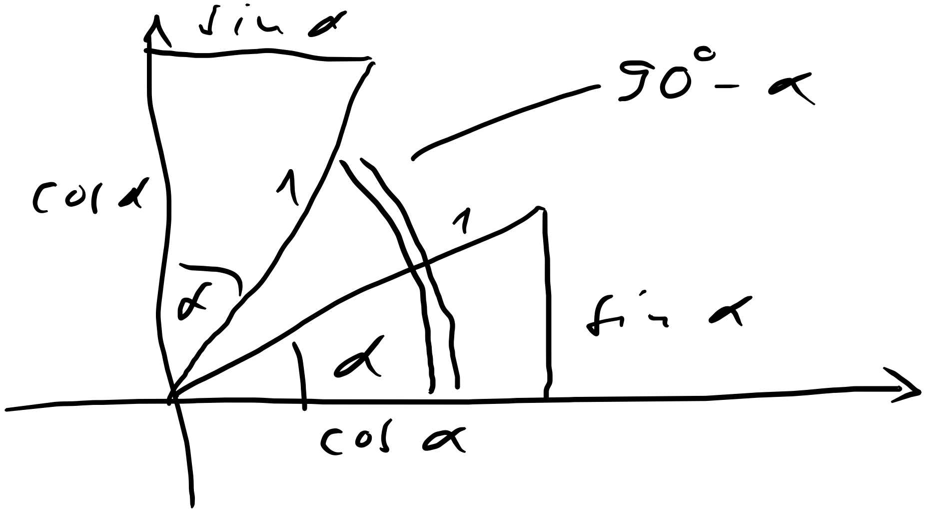
$\cos\alpha - i\sin\alpha$ hossza 1.

$\sin\alpha + i\cos\alpha$ Szög.



$\cos\alpha - i\sin\alpha =$

$= \cos(-\alpha) + i\sin(-\alpha)$



$\sin\alpha + i\cos\alpha =$

$= \cos(90° - \alpha) + i\sin(90° - \alpha).$

$\sqrt[3]{2}$

$$\sqrt[n]{\underset{\neq 0}{r}(\cos\alpha + i\sin\alpha)} = \sqrt[n]{r}\left(\cos\frac{\alpha+2k\pi}{n} + i\sin\frac{\alpha+2k\pi}{n}\right)$$

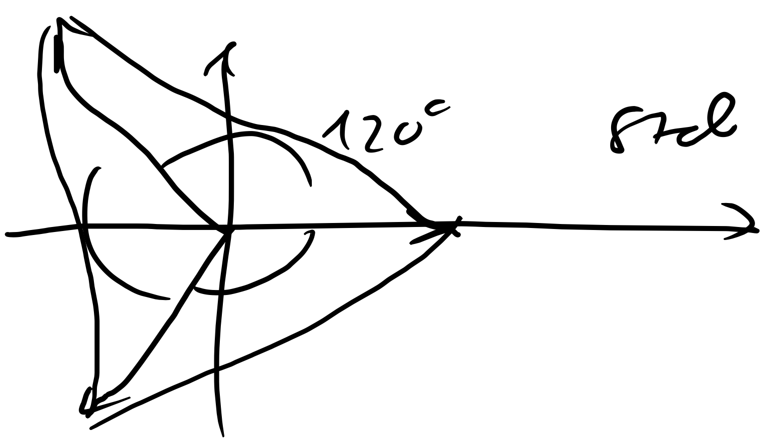
> 0 valós $\qquad k = 0, 1, \ldots, n-1.$

$2 = 2(\cos 0^\circ + i\sin 0^\circ) \qquad \alpha = 0,\ r = 2$

$k = 0 \qquad \sqrt[3]{2}(\cos 0 + i\sin 0) = \sqrt[3]{2}$

$k = 1 \qquad \sqrt[3]{2}\left(\cos\frac{360^\circ}{3} + i\sin\frac{360^\circ}{3}\right) = 120^\circ$

$k = 2 \qquad \sqrt[3]{2}\left(\cos\frac{720^\circ}{2} + i\sin\frac{720^\circ}{2}\right) = 240^\circ$



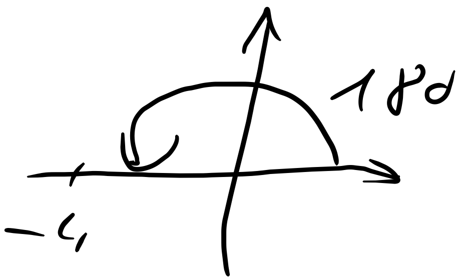
szab. $\triangle$

kp. O.

$\sqrt[4]{-4}$.

$|-4| = 4$

$-4 = 4(\cos 180^\circ + i \sin 180^\circ)$



$k=0 \quad \sqrt{2}(\cos 45^\circ + i \sin 45^\circ) = 1+i$

$k=1 \quad \sqrt{2}(\cos 135^\circ + i \sin 135^\circ) = -1+i$

$k=2 \quad \sqrt{2}(\cos 225^\circ + i \sin 225^\circ) = -1-i$

$k=3 \quad \sqrt{2}(\cos 315^\circ + i \sin 315^\circ) = 1-i$.

$\sqrt[4]{4} = \sqrt{2}$

$x^4 + 4 = 1 \cdot (x-(1+i))(x-(-1+i))(x-(-1-i))(x-(1-i))$

főegyüttható

$= (\overbrace{x-1}^{a}-\overbrace{i}^{b})\underbrace{(x+1-i)(x+1+i)}_{x^2+2x+2}(\overbrace{x-1}^{a}+\overbrace{i}^{b})$

$(a+b)(a-b) = a^2 - b^2$

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

$\overline{1+i} = 1-i \qquad \overline{-1+i} = -1-i$.

KONJUGÁLTAKAT párosítottuk.

$$(\underbrace{x^2 - \overset{b}{2x} + 2}_{a})(\underbrace{x^2 + \overset{b}{2x} + 2}_{c}) =$$

$$= (x^2+2)^2 - (2x)^2 = x^4 + 4x^2 + 4 - 4x^2 = \underline{\underline{x^4+4}}$$

$(1+i)^{1241}$ $\qquad$ $1+i = \sqrt{2}(\cos 45^\circ + i \sin 45^\circ)$

$$(r\cos\alpha + i\sin\alpha)^n = r^n(\cos n\alpha + i \sin n\alpha)$$

$$(1+i)^{1241} = (\sqrt{2})^{1241}(\cos \underbrace{1241\cdot 45^\circ} + i \sin 1241\cdot 45^\circ)$$

$1241 \cdot 45$ maradékosan 360-nal. Maradék 45.

$$1241 : 8 = 155$$
$$44$$
$$41$$
$$\boxed{\underline{1}}$$

$$= \sqrt{2}\, 2^{620}(\cos 45^\circ + i \sin 45^\circ)$$

$$= \underline{\underline{2^{620}(1+i)}}$$

$\sin 3x \qquad \sin x, \cos x$

$\longrightarrow \cos 3x + i\sin 3x = \underbrace{(\cos x + i\sin x)^3} =$

BINOMIÁLIS TÉTEL.

$(a+b)^3 = a^3 + 3a^2 b + 3ab^2 + b^3 \qquad 3 = \binom{3}{1} = \binom{3}{2}$

$= \cos^3 x + 3\cos^2 x\,(i\sin x) + 3\cos x\; i^2 \sin^2 x + (i\sin x)^3$

$= \cos^3 x + i\; 3\cos^2 x \sin x - 3\cos x \sin^2 x - i\sin^3 x.$

$\text{Im}: \sin 3x = 3\cos^2 x \sin x - \sin^3 x$

$\text{Re}: \cos 3x = \cos^3 x - 3\cos x \sin^2 x$

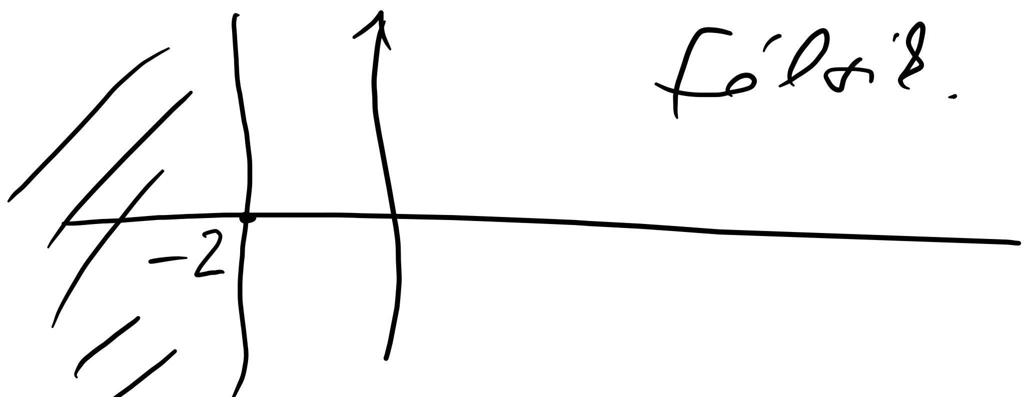
$\mathrm{Re}(z+2i) \leq -2.$

$z = x + iy \qquad \underbrace{\mathrm{Re}(x+iy+2i)}_{= x} \leq -2$

$\underline{x \leq -2.}$

Tipp: döntsd az egyenlőséget!

$x = -2$

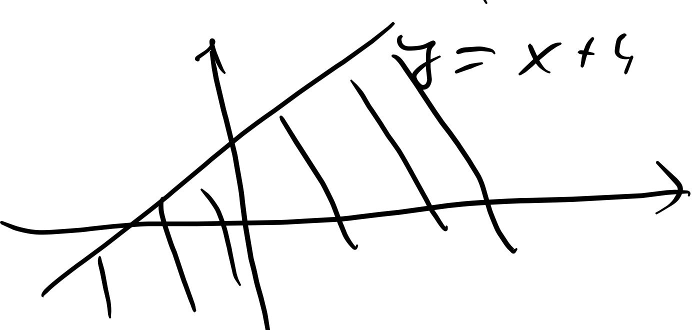


félsík.

$\mathrm{Re}(z+1) \geq \mathrm{Im}(z-3i)$

$\mathrm{Re}(x+iy+1) \geq \mathrm{Im}(x+iy-3i)$

$x+1 \geq y-3 \qquad y \leq x+4$



ALSÓ félsík.

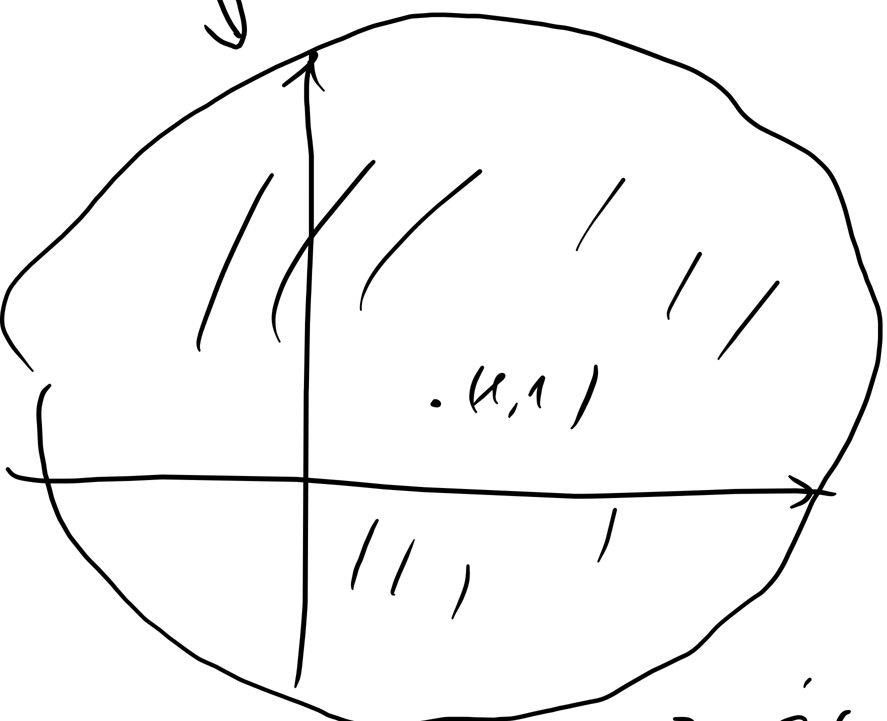
$|z - i - 1| \le 3$ $\qquad z = \sqrt{(\mathrm{Re}\, z)^2 + (\mathrm{Im}\, z)^2}$

$|x + iy - 1 - i| = \sqrt{(x-1)^2 + (y-1)^2} \le 3$ $\to$ belseje

$(x-1)^2 + (y-1)^2 = 3^2$

kör, kp $(1,1) = 1+i$

sugár $= 3$



Áll. z és w távolsága

w $|z - w|$

$w + x = z$

$x = z - w$

$|x| = |z - w|.$

$|z - i - 1| = z$ és az $i+1$ távolsága.

$$|z - 3 + 2i| = |z + 4 - i|$$

(HF Fapadosan végiggondolni.)

z és $3-2i$ távolsága = z és $-4+i$ távolsága.