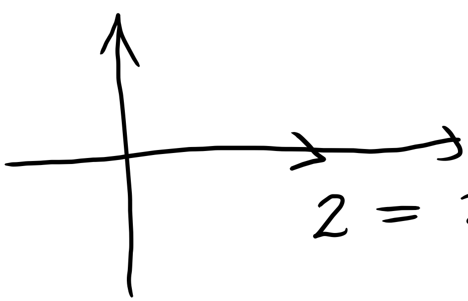
$$z = r(\cos\alpha + i\sin\alpha) \neq 0$$

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

$$k = 0, 1, \ldots, n-1.$$

udb n-edič noč.

$\sqrt[3]{2}$, $\sqrt[4]{-4}$



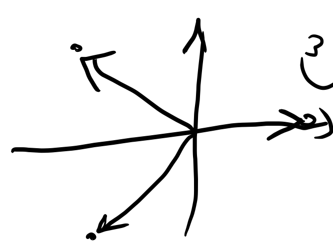
$2 = 2(\cos 0 + i\sin 0)$

$k=0$ $\sqrt[3]{2}\left(\cos\frac{0^\circ}{3} + i\sin\frac{0^\circ}{3}\right)$

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

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

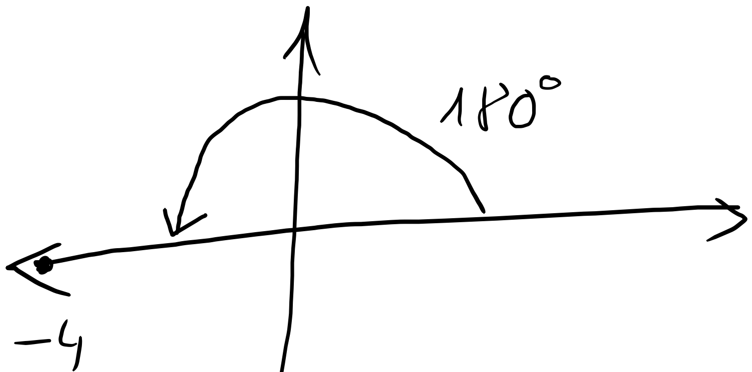
aral $\sqrt[3]{2}$



$\sqrt[3]{2}(\cos 120^\circ + i\sin 120^\circ)$

$\sqrt[3]{2}(\cos 240^\circ + i\sin 240^\circ)$

$\sqrt[4]{-4} = ?$ dgesrai dobra.



szöge = 180°

hossza = $|-4| = 4$

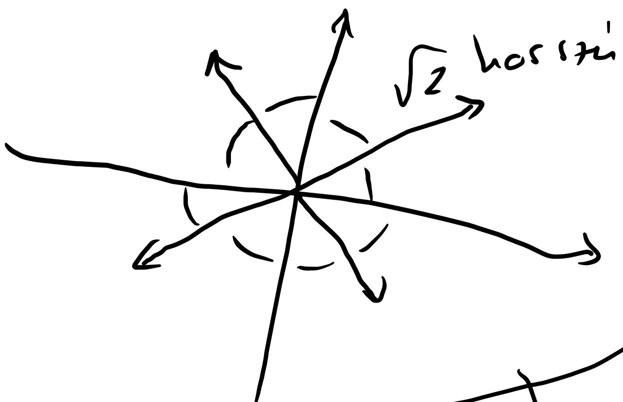
$k=0 \quad \sqrt{2}(\cos 45° + i\sin 45°) = 1+i$

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

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

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

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



Ált ha

w_0 egy n-edik gyöke z-nek, akkor a többi n-edik gyök

$w_0 \cdot \varepsilon^k$, ahol $\varepsilon = \cos\frac{2\pi}{n} + i\sin\frac{2\pi}{n}$

Spec $n=2 \quad w_0$ és $-w_0$

$n=4 \quad w_0,\ w_0 i,\ -w_0,\ -w_0 i$

$1x^4+4$ gyöktényezős alakja. $\quad x^4=-4$

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

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

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

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

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

$= x^2-2x+2$

$x^4+4 = (x^2+2x+2)(x^2-2x+2)$ Re: $\binom{1867}{0} - \binom{1867}{2} + \binom{1867}{4} - \dots$

X'' ciklus

HF

Ell: $(x^2+2)^2-(2x)^2 = x^4+4x^2+4-4x^2 = x^4+4$.

$\sin 7x = ?$

$(\cos x + i\sin x)^7 = \cos 7x + i\sin 7x$ ← Im

$(\cos x)^7 + \binom{7}{1}(\cos x)^6 i\sin x + \dots$ ← Im

HF

$S=\binom{1867}{0}+\binom{1867}{4}+\binom{1867}{8}+\dots$ (ursical)

$\binom{1867}{0}+\binom{1867}{1}+\dots = (1+1)^{1867}$

$\binom{1867}{0}+\binom{1867}{2}+\dots+\binom{1867}{1866} = 2^{1866}$ (felo $(1-1)^{1867}$ VOLT.)

$(1+i)^{1867} = \binom{1867}{0}+\binom{1867}{1}i+\binom{1867}{2}(-1)+\binom{1867}{3}(\underbrace{-i}_{i^3})+\dots$ ← Re

trig alak

$Re(z+2i) \le -2$ Rajzoljuk le

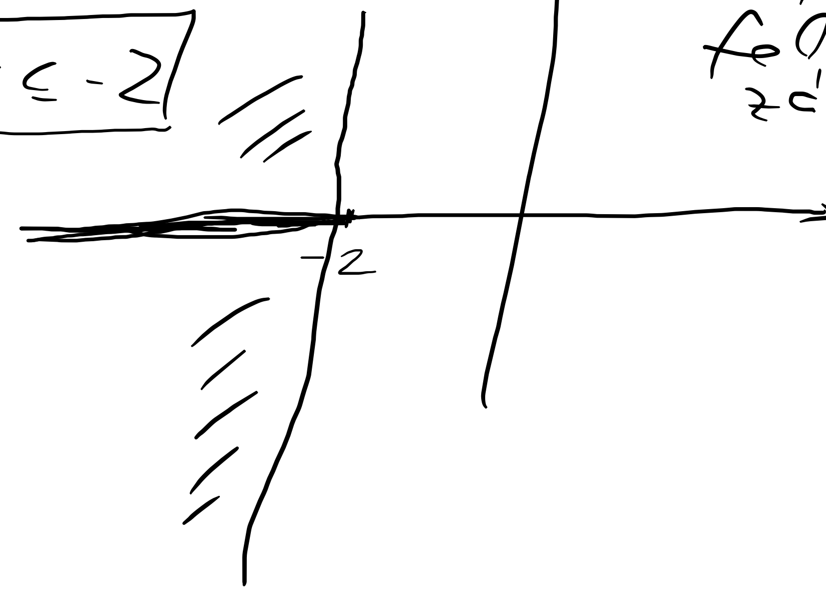
$z = x + iy$ x, y valós

$x + iy + 2i$ $\boxed{x \le -2}$

Re: x

y bázis

félsík zárt



$Re(z+1) \ge Im(z-3i)$

$z = x + iy$

$z + 1 = x + 1 + iy$

$Re(z+1) = x+1$ $\ge$

$z - 3i = x + iy - 3i$

$y - 3 = Im(z-3i)$

$\boxed{y \le x + 4}$

először az egyenlőség esetét

$|z - i - 1| \le 3$

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

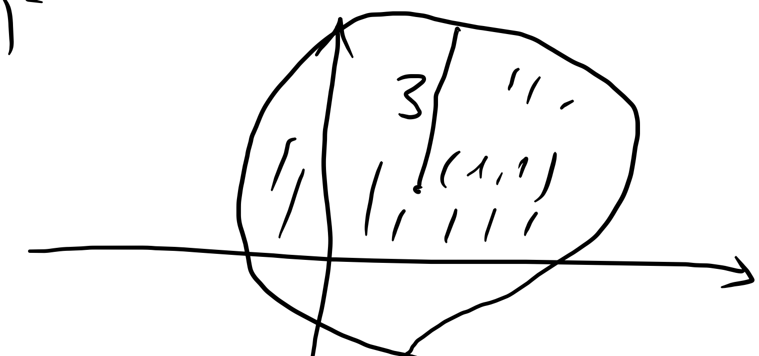
Re: $x - 1$

Im: $y - 1$

$(x-1)^2 + (y-1)^2 \le 3^2$

Ha = lenne: kör

$|z| = \sqrt{(\mathrm{Re}(z))^2 + (\mathrm{Im}\, z)^2}$



$|z - w|$ a z és w <u>TÁVOLSÁGA</u>

$|z - (1+i)| \le 3$

z jó, ha $1+i$-től vett távolsága ≤ 3.

$\Rightarrow$ körlap.

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

$$|z|^2 = z\cdot\bar z$$

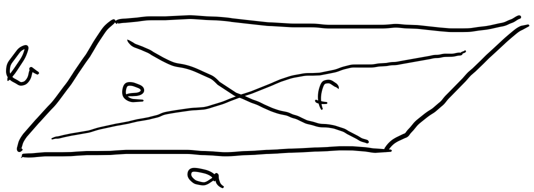
$$\overline{z+w} = \bar z + \bar w$$

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

szakaszfelező ⊥.

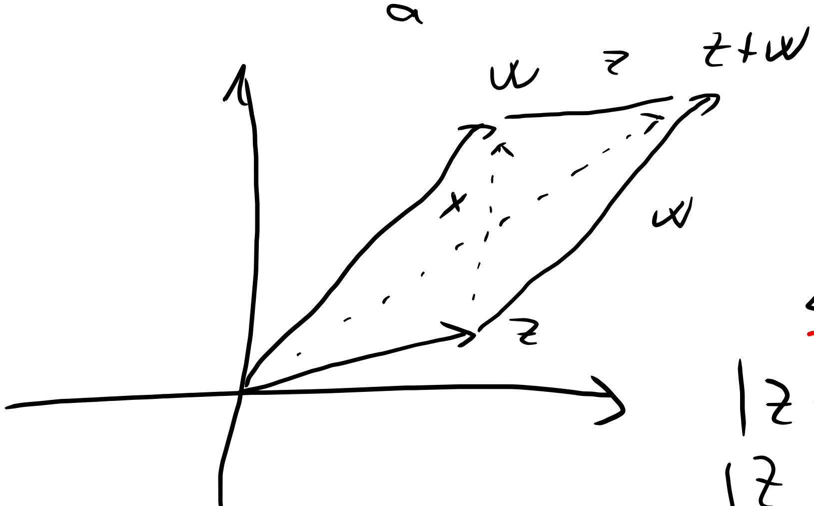
z egyenlő távolságra van $3-2i$-től és $-4+i$-től.

HF egyenletét $z = x+iy$.



$$2a^2+2b^2 = e^2+f^2$$

komplex számokkal.



átlók: $z+w$

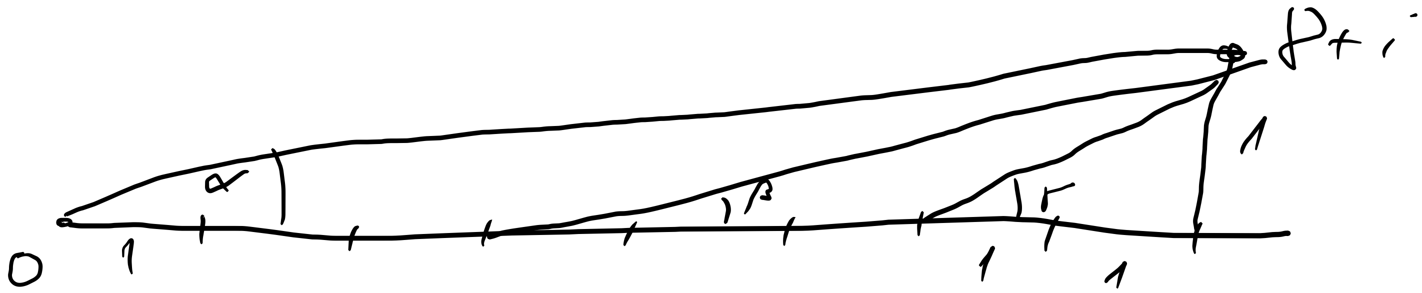
$z+x = w \qquad x = w-z$

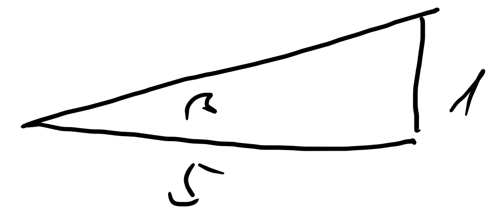
$$2|z|^2 + 2|w|^2 \overset{?}{=} |z+w|^2 + |z-w|^2$$

$$|z+w|^2 = (z+w)(\overline{z+w}) = z\bar z + w\bar w + z\bar w + w\bar z$$

$$|z-w|^2 = (z-w)(\overline{z-w}) = z\bar z + w\bar w - z\bar w - w\bar z$$

$+$ kész.





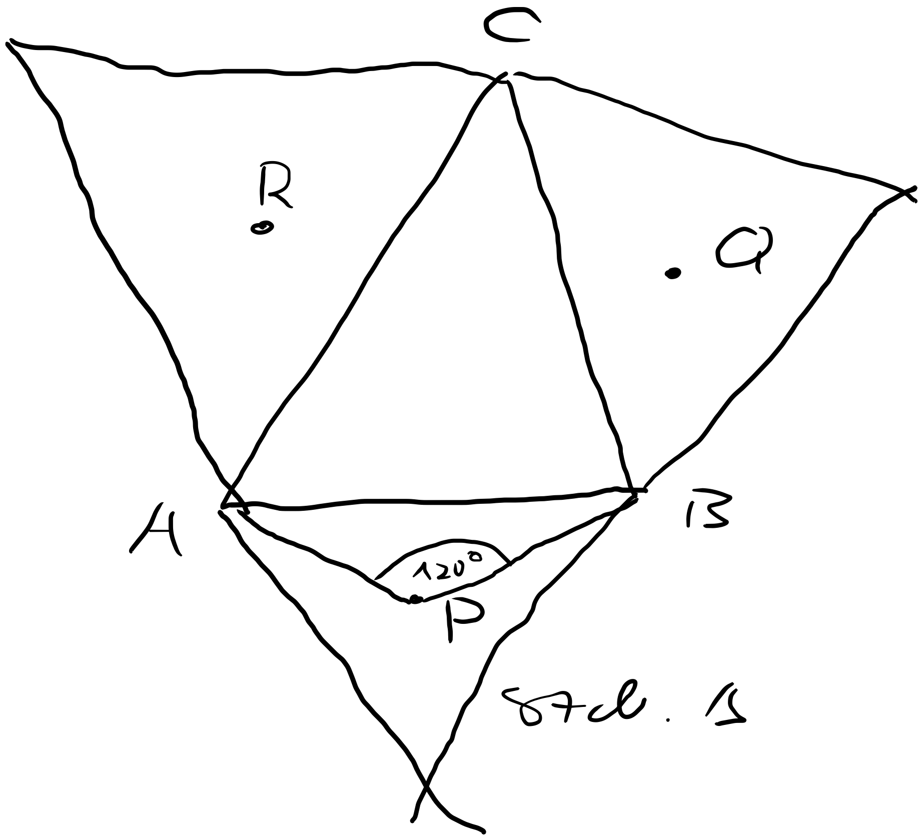
$\alpha = 8+i$ tröge

$\beta = 5+i$ — " —

$\gamma = 2+i$ — " —

$(8+i)(5+i)(2+i)$ tröge $\alpha+\beta+\gamma$

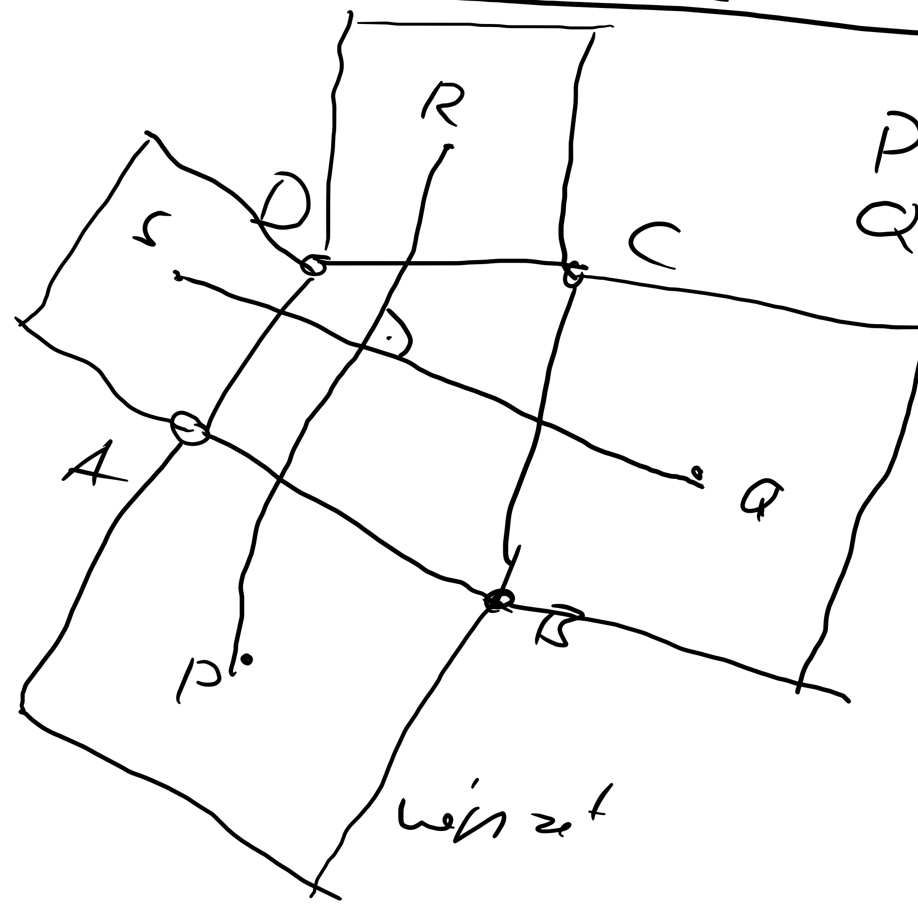
$$\overset{\|}{(39+13i)}(2+i) = \underline{\underline{65+65i}}$$ stöje $45°$ ✓



(ε^2 körüli $60°$)

Ált $\forall$ ABC Δ-re PQR szabályos Δ lesz.

$\overrightarrow{PQ} \cdot \varepsilon^2 = PR$



PR és QS $\perp$ és egyenlő hosszú.

20. Medvesak

PB-t $+120°$-kal P körül forgatjuk, akkor PA lesz belőle.

$PB = B - P$

$PA = A - P$

$120°$ forgatás $120°$ szögű, 1 hosszú számmal szorzás

$\varepsilon = \cos 120° + i \sin 120° \mid (A-P) = (B-P)\varepsilon \Rightarrow P = -\dfrac{B-A}{1-\varepsilon}$