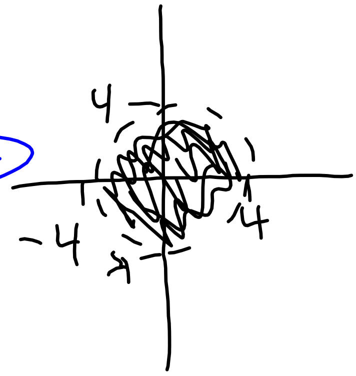
① Sketch the region in the complex plane where

a) $|z|<4$

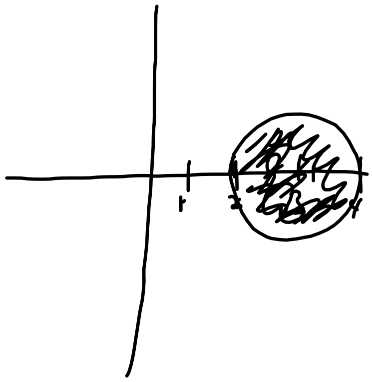


b) $|z-3|\leq 1$

c) $1<\operatorname{Im} z\leq 2$

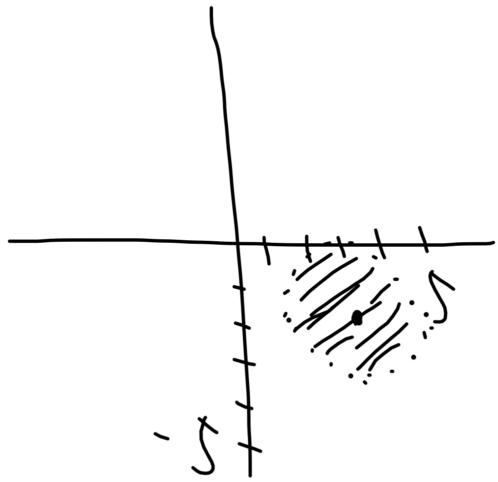
d) $-\frac{\pi}{3}<\operatorname{Arg} z\leq\frac{\pi}{2}$

$|z-3| \leq 1$

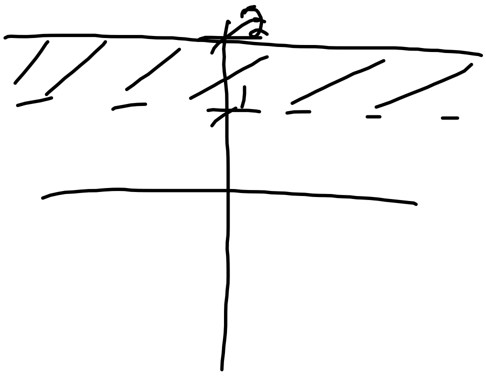


$\{ z \in \mathbb{C} \mid |z-3+2i| < 2 \}$

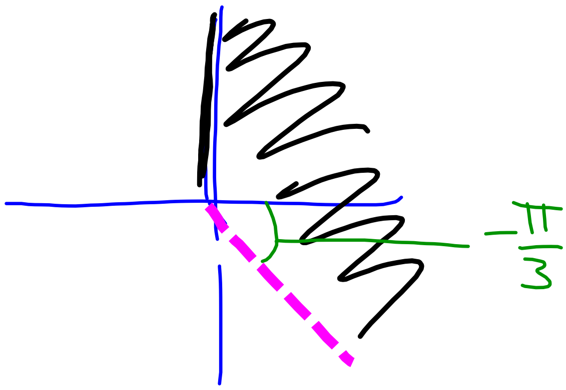
$|z-(3-2i)| < 2$



$1 < \mathrm{Im}\, z \leq 2$



$-\frac{\pi}{3} < \mathrm{Arg}(z) \leq \frac{\pi}{2}$



$\mathbb{C}$ distance between z_1 and z_2 is $|z_1 - z_2|$

Set with a distance is called a metric space

Define continuity with either

* a distance
* open sets

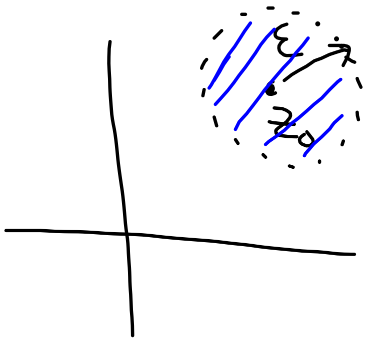
Topological space

ε-neighborhood of z_0

CB

$$\boxed{\{z\in\mathbb{C} \mid |z-z_0|<\varepsilon\}}$$

Picture

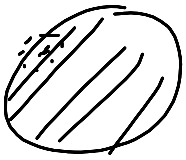


Let $a\in\mathbb{C}$

4G $D_r(a)=\{z\in\mathbb{C} \mid |z-a|<r\}$

Open disk of radius r, centered at a.

Set $S \subseteq \mathbb{C}$



z is an interior point of S if there exists an ε neighborhood of z that lies entirely in S.

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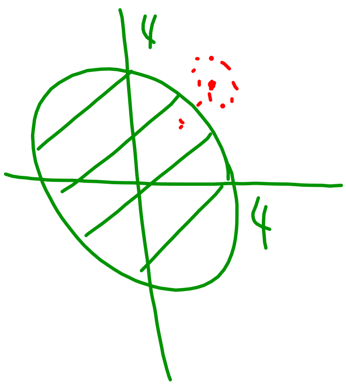
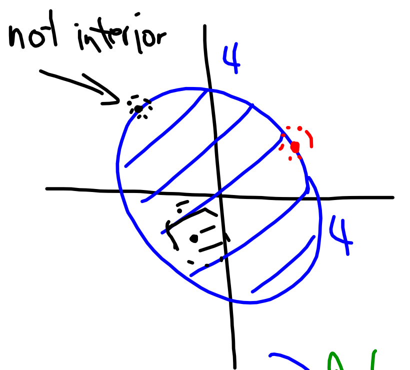
z is an exterior point of S if there exists an ε neighborhood of z ~~that lies entirely outside of S.~~ such that $D_\varepsilon(z) \cap S = \emptyset$

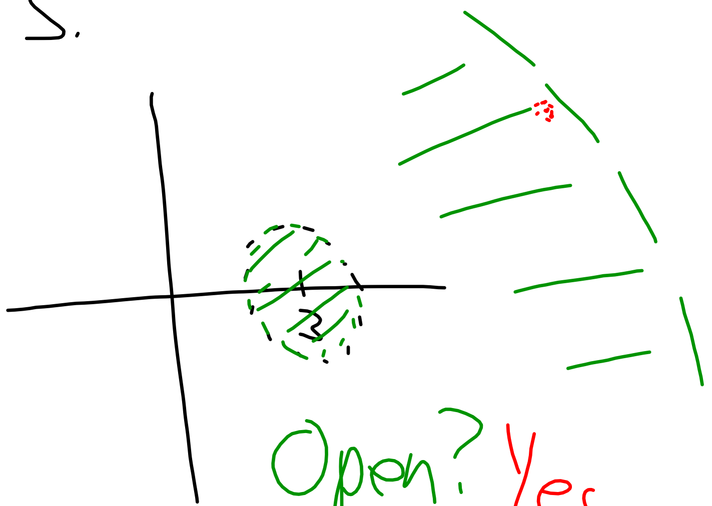
$D_\varepsilon(z)$



A subset $S \subseteq \mathbb{C}$ is open if every $z \in S$ has an ε neighborhood contained in S.



open? No



Open? Yes