Regions in the Complex plane :-

1) Let z_0 be a point in complex plane C, the set of points $N_\rho = \{z : |z - z_0| < \rho\}$, is called Neighborhood of z_0 and it is circular disk (region) with center z_0 and radius ρ.

(2) Let S be a set of complex numbers, The point z_0 is called interior point in S if there is neighborhood N of z_0 such that $\vec{N}$ is a subset of S.

(3) The point z_0 is called exterior point of S if there is neighborhood N of z_0 such that it not contian any point from points of S.

(4) The point z_0 is called Boundary point of the Set S when every neighborhood of z_0 contians points anterior and exterior we denote by b(S).

(5) Isolated Point :-

$N(z_0, \epsilon) \cap S = \{z_0\}$.

⑥ accumulation point

$[N(z_0;\epsilon) \cap S] - \{z_0\} \neq \emptyset$.

and denoted by $d(S)$.

⑦ Complement Set:

the set S^c is all points not belong to S

i.e. $S \cap S^c = \emptyset$.

⑧ Bounded Set:

The set S is called bounded set if there is $k > 0$ such that $|z| \leq k$ $k \in Z^+$. $\forall z \in S$.

ex: $S = \{z \in \mathbb{C} / |z| < 2\}$ is bounded if take $k = 3$, and $S = \{z \in \mathbb{C} / |z| > 3\}$ $\forall z \in S$,

⑨ open Set

The set S is called open set if contains the interior points only. like,

$S = \{z \in \mathbb{C} / |z| < 2\}$ is open set

and $S = \{z \in \mathbb{C} / |z| \leq 2\}$ is not open set since

$S^c = \{z \in \mathbb{C} / |z| > 2\}$ is not open.

⑨ Closed Set

If all $d(s) \leq S$.

$S = \{z \in \mathbb{C} / |z| \leq 2\}$ is closed set since $S^c = \{z \in \mathbb{C} / |z| > 2\}$ is open set.

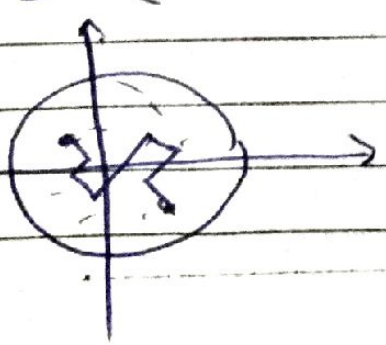
⑪ Compact Set

The set S is called compact set if S is closed and bounded ex: $S = \{z \in \mathbb{C} / |z| \leq 1\}$.

⑫ Connected Set

the set S is called connected set if any two of its points can be joined by continuous curve contain all of whose points belong to the region. ex//

$S = \{z \in \mathbb{C} : |z| \leq 1\}$ is connected set



(13) open Region

is a set of open and connected point

ex

$z = \{z \in \mathbb{C} : |z| < 2\}$.

(14) closed Region

is a set of closed and connected point.

ex,

$S = \{z \in \mathbb{C} : |z| \leq 2\}$.