• A nonempty subset G of the complex plane is said to be **open** if for every $g \in G$, there is a positive number r_g such that the disc $D(g; r_g) = \{z \in \mathbf{C} : |z - g| < r_g\}$ is contained in G.

• A nonempty subset S of the complex plane is said to be **disconnected** if there exist open sets U and V such that $S \cap U$ and $S \cap V$ are nonempty, $S \subseteq U \cup V$, and $S \cap U \cap V = \emptyset$. A subset of the complex plane is **connected** if it is not disconnected.

• A nonempty subset of the complex plane is said to be **polygonally connected** if every pair of points in the set can be connected by a polygonal curve which is contained entirely within the set.

Suppose that $\{z_n\}$ is a complex sequence.
• We say that $\lim_{n\to\infty} z_n = z$, $z \in \mathbf{C}$, if $\lim_{n\to\infty} |z_n - z| = 0$.

• We say that $\lim_{n\to\infty} z_n = \infty$ if $\lim_{n\to\infty} |z_n| = \infty$.

• Suppose that $f : D(z_0; R) \to \mathbf{C}$ is a function. We say that f is **continuous** at z_0 if for every sequence $\{z_n\}$ contained in $D(z_0; R)$ such that $\lim_{n\to\infty} z_n = z_0$, we have $\lim_{n\to\infty} f(z_n) = f(z_0)$.

• The **exponential function** is defined as follows:

$$\exp(z) = e^x(\cos y + i \sin y), \qquad z = x + iy \in \mathbf{C}.$$

• **Triangle Inequality:** If z and w are complex numbers, then $|z + w| \le |z| + |w|$.

• **De Moivre's Formula:** If θ is a real number and n is any integer, then $(\cos\theta + i \sin\theta)^n = \cos(n\theta) + i \sin(n\theta)$.

• **Epsilon-Delta Characterization of Continuity:** A function $f : D(z_0; R) \to \mathbf{C}$ is continuous at z_0 if and only if, given $\epsilon > 0$, there is a positive number δ, which may depend on ϵ, such that $|f(z) - f(z_0)| < \epsilon$ whenever $|z - z_0| < \delta$.