1 Introduction and Review

- For any function $f(x)$ and for any $ain\mathbb{R}$, define $f(a^+) = \lim_{x \to a^+} f(x), f(a^-) = \lim_{x \to a^-} f(x)$
- A function $f(x)$ is continuous at $x = a$ iff $f(a^+) = f(a^-) = f(a)$.
- If $f(x)$ is continuous on the open interval I iff $f(x)$ is continuous for all $x \in I$.
- $f(x)$ is an even function on the interval I iff $f(-x) = f(x)$ for all $x \in I$.
- $f(x)$ is an odd function on the interval I iff $f(-x) = -f(x)$ for all $x \in I$.

1.0.1 Identities and Inequalities

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

And we can construct more using this.

Example (1)**.** Prove the **triangle inequality**: $|a + b| \leq |a| + |b|$ for $a, b \in \mathbb{R}$.

Proof

The proof is trivial and is left as an exercise for the readers. (Use cases). □