Presented in class by
Casey Husseman
Real Analysis 12:40

\[ P \, 1.3.10 \text{ part 1} \]

\[ |a| = a \text{ if } a \text{ is positive}, \; |a| = -a \text{ if } a \text{ is negative}, \; \text{and } |a| = 0 \text{ if } a = 0 \]

First, let \( a \) be positive. This implies \( a > 0 \). The definition of absolute value states \( |x| = x \) for \( x \geq 0 \), thus \( |a| = a \).

Second, let \( a \) be negative. This implies \( a < 0 \). The definition of absolute value states \( |x| = -x \) for \( x \leq 0 \), thus \( |a| = -a \).

Finally, let \( a = 0 \) The definition of absolute value states \( |x| = x \) for \( x \geq 0 \), thus \( |a| = a = 0 \), or \( |a| = 0 \).

Q.E.D.