3) \[ \sum \frac{(-1)^n}{\sqrt{n+1}} \text{ is Algebraic.} \]

**Absolute Convergence**

\[ \sum \frac{1}{\sqrt{n+1}} \text{ diverges by comparison test with } b_n = \frac{1}{\sqrt{n}} \]

**AST**

\[ b_n = \frac{1}{\sqrt{n+1}} \]

(i) \( \sqrt{n+1} > 0 \) and increasing \( \Rightarrow \frac{1}{\sqrt{n+1}} \) is decreasing

or

\[ f'(n) < 0 \]

or

\[ \frac{1}{\sqrt{n+2}} < \frac{1}{\sqrt{n+1}} \]

\[ \frac{\sqrt{n+1}}{\sqrt{n+2}} \leq 1 \]

\[ n+1 \leq n+2 \]

\[ 1 \leq 2 \text{ True} \]

(ii) \( \lim_{n \to \infty} \frac{1}{\sqrt{n+1}} = 0 \) Form \( \frac{1}{\infty} \)

Converges by the AST