

7. [10 points] Determine if the following series absolutely converges, conditionally converges, or diverges, and circle the corresponding word. **Fully justify** your answer including using **proper notation** and showing mechanics of any tests you use.

$$\sum_{n=2}^{\infty} \frac{(-1)^n}{\sin\left(\frac{1}{n}\right) + \sqrt{n^2 + 1}}$$

Hint: the function $\sin(\frac{1}{x}) + \sqrt{x^2 + 1}$ is a monotone increasing function for $x \geq 2$.

Circle one: **Converges Absolutely** **Converges Conditionally** **Diverges**

Justification: