Print your name: ____________________

Answer each question completely. You must justify your answers to get credit. Even a correct answer with no justification will get no credits.

Consider the series $\sum_{n=1}^{\infty} \frac{1}{n^{\frac{3}{2}}+1}$.

1. Thinking about what you have learned so far, what do you **think** the behavior of this series is? No justification needed. (Answer this question before the next questions; you are **not** allowed to change your answer.) (1 pts)

☒ Convergent ☐ Divergent

(It looks like the p-series w/ $p = \frac{3}{2} > 1$.)

2. Apply the **divergence test** to check for convergence or divergence. What is the conclusion? (3 pts)

$$\lim_{n\to\infty} \frac{1}{n^{3/2}+1} = 0$$

$$\boxed{\text{INCONCLUSIVE}}$$

3. Apply the **ratio test** to check for convergence or divergence. What is the conclusion? (3 pts)

$$\rho = \lim_{n\to\infty} \left| \frac{a_{n+1}}{a_n} \right| = \lim_{n\to\infty} \left| \frac{1/((n+1)^{3/2}+1)}{1/(n^{3/2}+1)} \right|$$

$$= \lim_{n\to\infty} \frac{n^{\frac{3}{2}}+1}{(n+1)^{\frac{3}{2}}+1} = \lim_{n\to\infty} \frac{1+1/n^{3/2}}{(1+\frac{1}{n})^{\frac{3}{2}}+1/n^{3/2}} = 1$$

$$\boxed{\text{INCONCLUSIVE}}$$

4. Apply the **comparison test** to check for convergence or divergence. What is the conclusion? (*Hint: Your answer in problem 1 is important to find a candidate series to compare with.*) (3 pts)

$$\sum_{n=1}^{\infty} \frac{1}{n^{\frac{3}{2}}+1} \le \sum_{n=1}^{\infty} \frac{1}{n^{3/2}}$$

p-series w/ $p = \frac{3}{2} > 1$ which is <u>convergent</u>.

Therefore $\sum_{n=1}^{\infty} \frac{1}{n^{\frac{3}{2}}+1}$ is convergent.