Math 114 Name (print) Key

Quiz 8 **Spring 2002**

Work carefully and neatly. You must show all relevant work! You may receive no credit if there is insufficient work.

[3] 1. Determine if the series $\sum_{n=1}^{\infty} \frac{\ln n}{n^3}$ converges.

$$\frac{\ln n}{n^3} = \frac{\ln n}{n} \cdot \frac{1}{n^2}$$ ~~for~~ and $\ln n < n$

so $\frac{\ln n}{n^3} \leq \frac{1}{n^2}$ which converges

$\boxed{\text{hence the series converges}}$

[3] 2. Determine if the series $\sum_{n=1}^{\infty} \frac{1}{n^{1+\sqrt{n}}}$ converges.

$\frac{1}{n^{1+\sqrt{n}}}$. For $n \geqslant 4$, $\sqrt{n} \geqslant 2$. Thus

$1+\sqrt{n} \geqslant 2$ Hence

$\frac{1}{n^{1+\sqrt{n}}} \leq \frac{1}{n^2}$ - which converges

$\boxed{\text{Hence the series converges}}$

[4] 3. Determine if the series $\sum_{i=1}^{\infty} \frac{(-1)^{n+1} n}{2^n}$ is absolutely convergent, conditionally convergent, or divergent.

Ratio Test:

$\cancel{\frac{a_{n+1}}{a_{n+1}}}$ $\left|\frac{a_{n+1}}{a_n}\right| = \frac{n+1}{2^{n+1}} \cdot \frac{2^n}{n} = \frac{n+1}{n} \cdot \frac{1}{2}$

$\to \frac{1}{2}$ as $n \to \infty$

~~By~~ Since $\frac{1}{2} < 1$, the

$\boxed{\text{series converges}}$