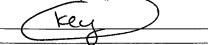
Name:



Show all work clearly and in order. Please box your answers.

1. Use the **Ratio Test** to determine whether the series converges or diverges. If the test is inconclusive then say so.

$$\lim_{n\to\infty} \frac{a_{n+1}}{a_n} = \lim_{n\to\infty} \frac{(n+2)!}{10^{n+1}} \cdot \frac{10^n}{(n+1)!} = \lim_{n\to\infty} \frac{(n+2) \cdot (n+7)!}{10!} = \lim_{n\to\infty} \frac{n+2}{10}$$

Series diverges

2. Use the **Root Test** to determine whether the series converges or diverges. If the test is inconclusive then say so.

$$\lim_{n\to\infty} \left(a_n\right)^{1/n} = \lim_{n\to\infty} \left[\left(1+\frac{1}{n^2}\right)^n\right]^{1/n} = \lim_{n\to\infty} \left(1+\frac{1}{n^2}\right) = 1+0 = 1$$

$$|n\to\infty| = \lim_{n\to\infty} \left[\left(1+\frac{1}{n^2}\right)^n\right]^{1/n} = \lim_{n\to\infty} \left(1+\frac{1}{n^2}\right) = 1+0 = 1$$

$$|n\to\infty| = 1+$$

3. Use the Alternating Series Test to determine whether the series converges. If the test is inconclusive then say so.

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

(a) Show:
$$\{\frac{1}{n^2+1}\}$$
 is decreasing

$$f(x) = \frac{1}{x^2 + 1} \longrightarrow f'(x) = \frac{(x^2 + 1)(0) - 1(2x)}{(x^2 + 1)^2} = \frac{-2x}{(x^2 + 1)^2} < 0$$