

**This test has page 1 - 5. Take a moment to make sure you've got them all.**

**No Calculators Allowed; No Reference Materials; Just You and Your Pencil and Eraser.**

- 1 If the improper integral  $\int_5^{\infty} \left[ \frac{1}{x-4} - \frac{1}{x+4} \right] dx$  is convergent, find its value. Otherwise, explain why it diverges.

MATH 175 001 – Test #3 – 4/12/02 – Name: \_\_\_\_\_2

- 2 Show steps in finding the interval of convergence for the power series  $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{(x-3)^n}{\sqrt{n}}$

- 3 Quickly use summation notation to write down the power series (about  $x = 0$ ) for for the following functions. Give the radii of convergence of the series.

(a)  $f(x) = \frac{1}{1 + 2x}$

(b)  $g(x) = \frac{2}{(1 + 2x)^2}$

4 Determine the convergence behavior of the series:

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

(b) 
$$\sum_{n=1}^{\infty} \frac{(4)(7)\cdots(3n+1)}{(2)(4)\cdots(2n)}$$

- 5 Find the most economical approximation within **0.01** of the value of  $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^n n!}$ . Show steps and explain briefly.