

PRINT NAME: _____

Calculus III [2433–001] Midterm I

For full credit, give reasons for all your answers.

Q1]...[points] Find the limits of the following sequence, giving reasons for your answer.

$$\left\{ \frac{(n!)^2}{(2n)!} \right\}_{n=1}^{\infty}$$

Q2]...[points] Test the following two series for convergence. If the series is convergent, find its sum.

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

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

Q3]...[points] State the *Alternating Series Test*.

Determine whether the following series is absolutely convergent, conditionally convergent, or divergent.

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

Q4]...[points] Use the integral test to test the following series for convergence.

$$\sum_{n=3}^{\infty} \frac{1}{n(\ln n)^{1,000}}$$

Q5]...[points] Compute the radius and interval of convergence for the following power series. Be sure to test the endpoints of the interval of convergence.

$$\sum_{n=1}^{\infty} \frac{e^n}{n} (x - 4)^n$$