

1. Consider the sequence:

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

a. Find the first 10 terms in this sequence using the **seq** command, then evaluate the fractions using the **evalf** command.

b. Does this sequence converge or diverge? You may want to use Maple's **limit** command.

2. Consider the series:

$$4 + \frac{-4}{3} + \frac{4}{5} + \frac{-4}{7} + \dots = \sum_{n=0}^{\infty} \frac{4(-1)^n}{2n+1}.$$

a. Create the sequence of partial sums, adding from 1 to 20 terms in this series. Give both fraction and decimal values. What is the decimal value of the 500th partial sum?

b. Does this series converge, and if so, to what value?

3. a. Find the Maclaurin series expansion to 8 nonzero terms of the function

$$f(x) = \sinh(2x).$$

b. Find the Taylor's series expansion to 8 nonzero terms of the function

$$f(x) = \tan(x),$$

about $x = \pi/4$.

4. Work Problems 10.1 and 10.8 (p. 116) from the text. For the graphs, show at least two periods of the function.

a. **10.1.** Find the Fourier series of the following function of period 2π and make plots that show the Gibbs phenomenon. (Use $n = 1, 3, 5, 10$, and 50 for the number of terms in your Fourier approximations for graphing.)

$$f(x) = \begin{cases} -3 & \text{if } -\pi < x < 0 \\ 3 & \text{if } 0 < x < \pi \end{cases}$$

b. **10.8.** Find the Fourier series of the following function of period 1 and make plots showing $n = 1, 3, 5, 10$, and 50 terms in your Fourier approximations.)

$$f(x) = \begin{cases} \frac{1}{2} + x & \text{if } -1/2 < x < 0 \\ \frac{1}{2} - x & \text{if } 0 < x < 1/2 \end{cases}$$