Physics 503: Scientific Computing

Homework #3

Topic: Recursive and difference functions

Due: Friday Feb. 23 by noon

Assignment

1. Write a recursive function to compute and return the value of the factorial of a number *n*: *n*! =n(n-1)(n-2)(n-4)…(1) and 0! = 1.
2. Write a function to compute the Taylor series expansion of the sin(x) function to an arbitrary order N. The expansion is $\sin(x) \cong x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + ... \frac{x^N}{N!}$. Pick a value for *x* and compute the difference between sin(*x*) and the expansion for a range of N values (say 3, 7, 11, 21). Make a plot of the error (difference) vs value of N. Make a second plot of the sin(*x*) and each of the expansion over the domain x = [-π,π].