Section 9.8 – Maclaurin & Taylor Series; Power Series

1-10 Use sigma notation to write the Maclaurin series for the function.

1. e^{-x} 5. $\ln(1+x)$ 9. $x \sin x$

11-18 Use sigma notation to write the Taylor series about $x = x_0$ for the function.

11. $e^x; x_0 = 1$ 13. $\frac{1}{x}; x_0 = -1$

15. $\sin \pi x\,; x_o = \frac{1}{2}$ 17. $\ln x\,; x_0 = 1$

19-22 Find the interval of convergence of the power series, and find a familiar function that is represented by the power series on that interval.

19. $1 - x + x^2 - x^3 + \cdots + (-1)^k x^k + \cdots$

21. $1 + (x-2) + (x-2)^2 + \cdots + (x-2)^k + \cdots$

29-50 Find the radius of convergence and the interval of convergence.

29. $\sum_{k=0}^{\infty} \frac{x^k}{k+1}$ 35. $\sum_{k=1}^{\infty} \frac{x^k}{k(k+1)}$ 39. $\sum_{k=0}^{\infty} \frac{3^k}{k!} x^k$

43. $\sum_{k=0}^{\infty} \left(\frac{3}{4}\right)^k (x+5)^k$ 45. $\sum_{k=1}^{\infty} (-1)^k \frac{(x+1)^k}{k}$ 49. $\sum_{k=0}^{\infty} \frac{\pi^k (x-1)^{2k}}{(2k+1)!}$

54. If a function *f* is represented by a power series on an interval, then the graphs of the partial sums can be used as approximations to the graph of *f*.

a. Use a graphing utility to generate the graph of $\frac{1}{1-x}$ together with the graphs of the first four partial sums of its Maclaurin series over the interval (-1,1)

b. In general terms, where are the graphs of the partial sums the most accurate?