

Warm-Up Problems and Lecture Problems

April 18, 2003

Power series that we know:

$$\begin{aligned}\frac{1}{1-x} &= \sum_{n=0}^{\infty} x^n = 1 + x + x^2 + x^3 + \cdots \\ \ln(1-x) &= -\sum_{n=1}^{\infty} \frac{x^n}{n} = -x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \cdots \\ e^x &= \sum_{n=0}^{\infty} \frac{x^n}{n!} = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots \\ \tan^{-1} x &= \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{2n+1} = x - \frac{x^3}{3} + \frac{x^5}{5} - \cdots\end{aligned}$$

- Find the derivative of $\frac{1}{1-x}$.
 - Find a power series for $\frac{1}{(1-x)^2}$.
- Find a power series for e^{2x} .
- Find a power series, centered at $x = 0$, for $\frac{1}{4+x}$.
- Find a power series, centered at $x = 0$, for $\ln(4+x)$.

Lecture Problems

5. Find the Taylor series for $\sin x$, centered at $x = \frac{\pi}{6}$.