

Warm-Up Problems and Lecture Problems

April 25, 2003

$$\begin{aligned}e^x &= 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \dots \\ \sin x &= x + \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \dots \\ \cos x &= 1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \dots \\ \frac{1}{1-x} &= 1 + x + x^2 + x^3 + x^4 + \dots \\ \tan^{-1} x &= x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \dots \\ \ln(1-x) &= -x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \dots \\ \ln x &= (x-1) - \frac{(x-1)^2}{2} + \frac{(x-1)^3}{3} - \frac{(x-1)^4}{4} + \dots\end{aligned}$$

1. Which Taylor polynomial should you use to approximate $\sin(\pi/5)$ to within 0.001?

Lecture Problems

2. How accurate does the Taylor polynomial of degree 5, $T_5(x)$, approximate $\sin(\pi/5)$?
3. For what values of x does the Taylor polynomial of degree 5 approximate $\sin(x)$ to within 0.001?