

Warm-Up Problems and Lecture Problems

April 23, 2003

1. Find the Taylor series for e^{-x} centered at 0.

2. We know the series for e^x :

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \cdots$$

How is this series related to your answer in question 1?

Lecture Problems

3. Using a Taylor polynomial for $f(x) = e^x$, find e , accurate to within 0.01:

(a) For any n , what is the n -th derivative of $f(x)$? $f^{(n)}(x) =$

(b) Find an integer M so that $|f^{(n)}(x)| \leq M$ for all x in the interval $[-1, 1]$. (This will be your value for M .)

(c) Find the smallest integer N so that $\frac{M(1^{N+1})}{(N+1)!} < 0.01$

(d) For the value of N that you found, write down the N -th Taylor polynomial $T_N(x)$:

(e) For your value of N , compute $T_N(1)$.

(f) Compare $T_N(1)$ with e on your calculator.