

SE301 Numerical Methods

Term 071 (Summer 2007)

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Section 3

HW#2	Taylor Series	Due date	Sep 24,2007
Instructions: Taylor series is usually covered in MATH 102, Review the Taylor series from the MATH102 text book. Taylor series is covered in Chapter 4 of the text.			

Problems 1-3: Find the Maclaurine Series expansion (first 3 non-zero terms) of f(x)

1. $f(x) = \sin(3x)$

2. $f(x) = \frac{x-1}{x+1}$

3. $f(x) = e^{0.5x}$

Problems 4-6: Find the Taylor series expansion (first 3 non-zero terms) centered at the given value of c.

4. $f(x) = \frac{e^{2x}-1}{x}$, $c = -0.5$

5. $f(x) = 2x^3 + x^2 + 1$, $c = 1$

6. $f(x) = \frac{1}{\sqrt{x}}$, $c = 4$

7. Consider the Taylor series expansion of f(x) about the center of expansion c .

Prove that if $|f^{(3)}| \leq M$ for $|x-c| \leq d$ then the remainder R_3 satisfies

$$R_3 \leq \frac{M}{6} |x-c|^3 \quad \text{for } |x-c| \leq d$$

8. How many terms of the Maclaurine series are needed to approximate

$f(x) = e^{-0.5x}$ over the interval $[-1,1]$ with error less than 0.01

9. Problem 4.3 (page 97 of the text book)

10. Problem 4.4 (Page 97 of the text book)