Spring 2013 Math 152

Week in Review 8

courtesy: Amy Austin

(covering section 10.7-10.9)

Section 10.7

1. Find the Taylor Series for f centered at -4 if $f^{(n)}(-4) = \dfrac{(-2)^n n!}{7^n(n+5)}$.

2. Find the Taylor Series for $f(x) = \dfrac{1}{x}$ at $x = 3$ and the associated radius of convergence.

3. Find the Taylor Series for $f(x) = xe^x$ centered at 3. What is the associated radius of convergence?

4. Find the Maclaurin series for $f(x) = e^x$ and the associated radius of convergence.

5. Find the Maclaurin series for $f(x) = \sin x$ and the associated radius of convergence.

6. Find the Maclaurin series for $f(x) = \cos x$ and the associated radius of convergence.

7. Use a known MacLaurin series derived in this section to obtain a Maclaurin Series for:

   a.) $f(x) = \cos(x^3)$

   b.) $f(x) = xe^{-x}$

   c.) $f(x) = \sin(\dfrac{x}{2})$

8. Express $\displaystyle\int \frac{\sin 2x}{x}\,dx$ as an infinite series.

9. Use series to approximate $\displaystyle\int_0^{0.5} \cos(x^2)\,dx$ with error less than 10^{-3}

10. Find the sum of the series $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n 2^{n+1} x^{3n}}{n!}$.

11. Find the sum of the series $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n (\pi)^{2n+1}}{3^{2n}(2n)!}$

12. Find the sum of the series $5 + \dfrac{25}{2} + \dfrac{125}{3!} + \dfrac{625}{4!} + \ldots$

13. Find the 20th derivative of $f(x) = e^{x^2}$ at $x = 0$.

Section 10.9

14. Find the third degree Taylor Polynomial for $f(x) = \cos x$ at $x = \dfrac{\pi}{3}$.

15. Find the second degree Taylor Polynomial for $f(x) = \ln x$ at $x = 2$. Using Taylor's Inequality, find an upper bound on the remainder in using $T_2(x)$ to approximate $f(x) = \ln x$ for $1 \le x \le 3.2$.