Exam 4 Calc 2 4/23/2009

Each problem is worth 10 points. For full credit provide complete justification for your answers.

1. Write a 5^{th} degree MacLaurin polynomial for $\sin x$.

2. Give an example of a series which converges, but does not converge absolutely.

3. Determine whether the series $\sum_{n=0}^{\infty} \frac{\sqrt{n+1}}{2^n}$ converges or diverges.

4. Determine the interval of convergence of the MacLaurin polynomial for $f(x) = e^x$.

5. Determine whether the series $\sum_{n=2}^{\infty} \frac{1}{n \ln n}$ converges or diverges.

6. Find the 2nd-degree Taylor polynomial for $f(x) = \sqrt[3]{1+x}$ centered at $x = 7$.

7. Biff is a calculus student at Enormous State University, and he's having some trouble. Biff says "Dude, I think I'm in trouble. This series stuff is pretty confusing, and all these different tests they've got are pretty crazy. I've got some of it figured out, but what I don't get is are there times when you've gotta use the comparison test instead of the limit comparison?"

   Help Biff by answering his questions as clearly as possible.

8. Is $x = 1$ included in the interval of convergence of the power series $\sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{2n+1}$?

9. Use a 4th-degree MacLaurin polynomial for $\cos(x^2)$ to approximate $\int_0^{0.1} \cos(x^2)\,dx$ to the nearest millionth.

10. Suppose $\sum_{n=1}^{\infty} a_n$ is a convergent series with all of its terms positive. What can you say about $\sum_{n=1}^{\infty} \left(\frac{n+1}{n} a_n \right)$?

Extra Credit (5 points possible):

What is the sum of the series $\sum_{n=3}^{\infty} \frac{(-1)^{n+1}}{n!}$?