Exam 4a   Calc 2   4/22/2011

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

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

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

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

4. Determine whether the series $\sum_{n=1}^{\infty} \frac{(-1)^n}{2n+1}$ converges or diverges.

5. Write the first 3 non-zero terms in the Taylor series for $f(x) = \sin x$ centered at $x = \pi/2$.

6. Find the radius of convergence for the power series $\sum_{n=0}^{\infty} \frac{x^{2n+1}}{(2n+1)!}$.

7. Bunny is a calculus student at Enormous State University, and she's having some trouble. Bunny says "Ohmygod. Our Calc book is so unfair. There are these questions in it, like where you're supposed to explain why something is true or not, right? Which is stupid, because you know they can't put something like that on a multiple choice exam anyway, right? But our discussion section teacher said the professor was really excited about trying to see if we had conceptual knowledge, whatever that is, so we should pay special attention to this one that asked, like, if $\Sigma\, a_n$ converges, then does $\Sigma\, (a_n + 0.0001)$ converge too. So it seems like 0.0001 isn't big enough to matter, but it feels like maybe a trick question, so I don't know."

   Help Bunny by explaining what conclusions could be drawn here and why as clearly as possible.

8. Find the MacLaurin series for $f(x) = \arctan x$.

9. Determine whether the series $\sum_{n=1}^{\infty} \frac{\ln n}{n^3}$ converges or diverges.

10. Find the interval of convergence for the series $\sum_{n=1}^{\infty} \frac{2^n x^n}{n^2}$.

Extra Credit (5 points possible):

Find the sum of the series $\sum_{n=1}^{\infty} \frac{n}{(n+1)!}$