136.271 Assignment 4

Due Wednesday, March 31, 2004, in class

1. Find the Maclaurin series representation for the following functions and identify the interval of convergence of the series.

(a) $\dfrac{e^{2x^2}-1}{x^2}$

(b) $\sin x \cos x$ (Hint: start with $\sin 2x$)

(c) $\tan^{-1}(3x)$

2. Find the Taylor series representation of the function $\ln x$ centered at a=3.

3. Use multiplication of series to find the first three nonzero terms of the Maclaurin series representation of the function $\ln(2+x)\cdot\tan^{-1}\left(x^2\right)$.

4. Use power series to evaluate $\int_0^x \cos(t^2)dt$.

5.

a) Use binomial series to find the power series representation of the function $\dfrac{1}{\sqrt{4+x^2}}$. Simplify your answer.

(**b**) Use your answer in (a) to compute the sum of $\sum_{n=1}^{\infty}(-1)^n \dfrac{(1)(3)\cdots(2n-1)}{2^{5n+1}n!}$.