NAME: _____

MATH 12003 **HOMEWORK #7 (14 pts)** **FALL 2009**

SHOW ALL WORK FOR FULL CREDIT — PLEASE CIRCLE YOUR FINAL ANSWER

DUE: TUESDAY, NOVEMBER 3, 2009 AT THE BEGINNING OF CLASS
NO EXCEPTIONS!!!

1. (1 pt each) Find the sum of $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n \pi^{2n}}{6^{2n+1}(2n)!}$

2. (2 pts each) Find a power series representation for the function and determine the interval of convergence.

   (a) $f(x) = \dfrac{x^2}{a^3 - x^3}$ where $a > 0$.

(b) $f(x) = \dfrac{x^2}{(1-2x)^2}$

3. (1 pt) Evaluate $\displaystyle\int \tan^{-1}(x^2)\,dx$ as a power series.

4. (2 pts each) Find the Taylor Series for $f(x)$ centered at the given value of a.

(a) $f(x) = \ln x, \qquad a = 2$

(b) $f(x) = \sin x, \qquad a = \dfrac{\pi}{2}$

5. (2 pts) Evaluate the indefinite integral as a power series.

$$\int \frac{x^3}{2+x}\,dx$$

6. (2 pts) Find the 3rd degree Taylor polynomial of $f(x) = \cos 3x$ about $x = \dfrac{\pi}{9}$.