Math 132
Worksheet 12 – April 17, 2012

Name _____

1. Explain in 1-3 sentences why there is no power series representation for $\ln x$ around 0.

2. Find a power series representation (around 0) of $\tan^{-1} x$. What is its radius of convergence?
   Hint: you already know a power series for $\frac{d}{dx} \tan^{-1} x$.

3. If $f(x) = \dfrac{1}{1+x^2}$, then find $f^{(11)}(0)$ and $f^{(12)}(0)$.
   Hint: there is a much easier way than taking 12 derivatives!

4. Taylor series

   (a) By taking the ith derivative and plugging in 0, verify that the Taylor series (around 0) of $\dfrac{1}{1-x}$ is $\displaystyle\sum_{i=0}^{\infty} x^i$.

   (b) By taking derivatives and plugging in 0, find the Taylor series (around 0) of $\dfrac{1}{\sqrt{1-x}}$. What is its radius of convergence?