Name: Key *Student ID:*_____
No Calculators.

The series

$$\tan x = x + \frac{x^3}{3} + \frac{2x^5}{15} + \frac{17x^7}{315} + \frac{62x^9}{2835} + \cdots$$

converges to $\tan x$ for $-\pi/2 < x < \pi/2$.

1. (*7 pts*) Find the first five terms of the series for $\ln|\sec x|$. For what values should the series converge?

The integral of $\tan x$ is $\ln|\sec x|$. So the series first five terms are $\int x + \frac{x^3}{3} + \frac{2x^5}{15} + \frac{17x^7}{315} + \frac{62x^9}{2835}\,dx$

$= \frac{x^2}{2} + \frac{x^4}{12} + \frac{2x^6}{90} + \frac{17x^8}{315 \cdot 8} + \frac{62x^{10}}{28350} + C$

By the term by term integration theorem this series should converges for $-\pi/2 < x < \pi/2$

2. (*3 pts*) Find the first five terms of the series for $\sec^2 x$.

The derivative of $\tan x$ is $\sec^2 x$

Thus the first 5 terms of the series for $\sec^2 x$ is $1 + x^2 + \frac{2x^4}{3} + \frac{17x^6}{45} + \frac{62x^8}{315}$