3. (60 pts) a. Find the power series representing 
   \( f(x) = \frac{1}{1+x} \)

b. Use part a. to find the power series for \( \ln(1+x) \)

c. Use one of the properties of logs together with part b. to evaluate 
   \( \int_0^2 \ln \left( \frac{1+x}{1-x} \right) \) using the first 3 terms of the series.

d. Find the power series for \( \frac{1}{1+x^2} \)

e. Use part d. to evaluate \( \lim_{x \to 0} \frac{\tan^{-1}x}{\sqrt{x}} \), using the first 3 terms