Name: Section: 11 12 13

1. Find where the power series converges abosolutely, where it converges conditionally, and where it diverges. State the interval of convergence and the radius of convergence.

$$\sum_{n=0}^{\infty}(-1)^n \frac{x^{2n+1}}{2n+1},$$

2. In lecture we showed that

$$\arctan(x) = x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \cdots = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{2n+1}, \qquad |x| \leq 1$$

   (a) Find the sum of the series $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots$

   (b) Find a power series representation for $\frac{\arctan x}{x}$ using algebra.

   (c) Use term by term integration to find a power series for $\int \frac{\arctan x}{x} dx$.