1. Does the sequence $a_n = \cos(n\pi)$ converge? What about the sequence $b_n = \cos(2n\pi)$?

2. What is the 13^{th} partial sum of the series $\Sigma_{n=1}^{\infty} 2^n$?

3. Determine whether the following series converge absolutely, converge conditionally, or diverge. Justify your answers by using the appropriate tests.

   (a)
   $$\sum_{n=2}^{\infty} \frac{n}{1-n^2}$$

   (b)
   $$\sum_{n=1}^{\infty} \frac{2n}{\sqrt{2+n^5}}$$

   (c)
   $$\sum_{n=1}^{\infty} \frac{(-1)^{n+1} n^3}{n+n^4}$$

   (d)
   $$\sum_{n=1}^{\infty} \frac{3^n (n!)^2}{(2n)!}$$

   (e)
   $$\sum_{n=1}^{\infty} \left(\frac{n+1}{n^2}\right)^{2n}$$

4. For which x does the series $\sum_{n=1}^{\infty} \frac{x^n (n!)^2}{(2n)!}$. Be careful to check your endpoints!!

5. Determine a series for $f(x) = \arctan(x^2)$, and find its radius of convergence.

6. Find a series and its radius of convergence for
   $$f(x) = \int_0^t \frac{\sin(t)}{t}\, dt$$
   Also, find $f(.5)$ correct to three decimal places.