1. A series is defined recursively as follows

$$a_{n+1} = \frac{1}{2}\left(a_n + \frac{2}{a_n}\right)$$

   where $a_1 = 1$. Find the limit of a_n as $n \to \infty$.

2. Determine whether the following series converge or diverge

   (a) $\displaystyle\sum_1^\infty \frac{n^2}{n!}$

   (b) $\displaystyle\sum_1^\infty \frac{1}{n(n+1)}$

3. Find the interval of convergence of the following power series

$$1 + 2x + 4x^2 + 8x^3 + 16x^4 + 32x^5 + \cdots$$

4. Find the first three non zero terms of the Maclaurin Series for the function $f(x) = e^{-x^2}$