1. **. Answer the following questions, giving some valid reasons to support your answer, not just answers.**

   (a) For $a_n = (-1)^n \dfrac{\ln n}{n}$,find $\lim_{n->\infty} a_n$?

   (b) For $a_n = (n-1)/n$, find $\lim_{n->\infty} a_n$?

   (c) Find $\lim_{n->\infty} \dfrac{1+2^n}{3^n}$

   (d) Find $\lim_{n->\infty} \dfrac{2^{2n}}{3^n}$?

   (e) Find $\lim_{n->\infty} \dfrac{(-1)^n}{2^n}$.

   (f) For $a_n = (n-1)/n$, find $\lim_{n->\infty} a_n$?

   (g) For $a_n = (-1)^n$, find $\lim_{n->\infty} a_n$?

   (h) Find $\lim_{n->\infty} \dfrac{1+2^n}{1-3^n}$

   (i) Find $\lim_{n->\infty} (1/3)^n$?

2. **For each of the following series determine if the series converges conditionally, converges absolutely or diverges.**

   (a) $\displaystyle\sum_{n=1}^{+\infty} (-1)^n \frac{\ln(n)}{n}$

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

   (c) $\sum_{n=0}^{\infty} \dfrac{2}{4n^2-1}$

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

   (e) $\displaystyle\sum_{n=1}^{+\infty} \frac{(-1)^n(2n+1)}{(5n+7)}$

   (f) $\displaystyle\sum_{n=1}^{+\infty} \frac{3^n}{n!}$

(g) $\sum_{n=1}^{+\infty} \frac{(-1)^n n^2}{3^n}$

(h)

(i) $\sum_{n=1}^{+\infty} \frac{2^n}{n^2}$

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

(k) $\sum_{n=0}^{+\infty} (-1)^n \frac{1}{n^3}$

(l) $\sum_{n=1}^{+\infty} \frac{n}{2^n}$

(m) $\sum_{n=1}^{+\infty} \frac{(-1)^n \ln(n)}{n}$

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

(o) $\sum_{n=1}^{+\infty} \frac{(-1)^n (n!)(n!)}{(2n!)}$

3. **For each of the following power series determine where the series converges or diverges,and determine the radius of convergence, also decide if the series converges at the ends and what type.**

(a) $\sum_{n=1}^{+\infty} x^n$

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

(c) $\sum_{n=1}^{+\infty} \frac{(-1)^n (2x-1)^n}{n^3}$

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