1. Determine the convergence or divergence of each of the following series. Justify your answers.
   (a). $\sum_{n=1}^{\infty}(\sqrt{2n+2}-\sqrt{n})$.
   (b). $\sum_{n=1}^{\infty}\frac{1\cdot 3\cdot 5\cdots(2n-1)}{n!}\cdot\frac{2^n}{5^n}$.
   (c). $\sum_{n=1}^{\infty}\frac{\ln n}{n^{1.2}}$.
   (d). $\sum_{n=1}^{\infty}\left(\frac{n}{n+2}\right)^{n^2}$.
   (e). $\sum_{n=2}^{\infty}\frac{1}{(\ln n)^3}$.
   (f). $\sum_{n=1}^{\infty}\left(\frac{4}{9}+\frac{n^3}{3^n}\right)^{\frac{n}{2}}$.
2. Consider the series $\sum_{n=1}^{\infty}(-1)^{n+1}\frac{\ln n}{\sqrt{n}}$.
   i) Use the alternating series test to show that the series is convergent.
   ii) Using part i) or otherwise, show that the series is conditionally convergent.
3. Show that the series $\sum_{n=1}^{\infty}(-1)^n\frac{\cos n}{2^n}$ is absolutely convergent.
4. For each of the following series, determine whether the series is absolutely convergent, conditionally convergent or divergent. Justify your answers.
   (a). $\sum_{n=1}^{\infty}(-1)^n\frac{3}{2n+1}$.
   (b). $\sum_{n=1}^{\infty}(-1)^n\frac{n}{4n+3}$.
   (c). $\sum_{n=1}^{\infty}(-1)^n\left(\frac{1+2n}{3+4n}\right)^n$.
   (d). $\sum_{n=2}^{\infty}(-1)^{n+1}\frac{1}{n\ln n}$.

Some suggested answers:

1(a). divergent.
1(b). convergent.
1(c). convergent.
1(d). convergent.
1(e). divergent.
1(f). convergent.
4(a). conditionally convergent.
4(b). divergent.
4(c). absolutely convergent.
4(d). conditionally convergent.