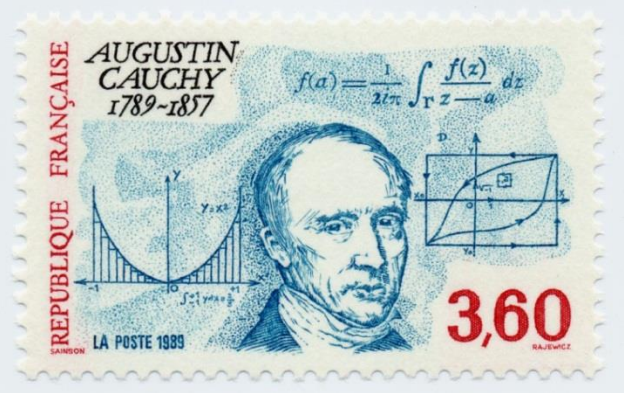
WORKSHEET XIII

ABSOLUTE & CONDITIONAL CONVERGENCE



1. Explain how the *ratio* and *root tests* can be extended for series more general than positive series.
2. State the **Cauchy-Leibniz rule** for alternating series.
3. For each of the following series, determine *absolute* convergence, *conditional* convergence or *divergence*.

   (*a*) $\sum \frac{(-1)^n}{n^3}$

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

   (*c*) $\sum_{n=1}^{\infty} \frac{(-1)^n n^n}{n!}$

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

(e) $\sum_{n=1}^{\infty} \frac{(-1)^n 5^n}{n^8}$

(f) $\sum_{n=1}^{\infty} \frac{(-1)^n (3n+5)}{2010n+1}$

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

(h) $\sum_{n=1}^{\infty} \frac{\cos n\pi}{n^{\frac{3}{2}}}$

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

(j) $\sum_{n=1}^{\infty} \frac{(-2)^{n+1}(3n+5)}{n+5^n}$

(k) $\sum_{n=1}^{\infty} (-1)^n \left(\sqrt{n+\sqrt{n}} - \sqrt{n} \right)$

(l) $\sum_{n=1}^{\infty} \frac{(-1)^n}{\arctan n}$

A man is like a fraction whose numerator is what he is and whose denominator is what he thinks of himself. The larger the denominator, the smaller the fraction.

– Leo Tolstoy