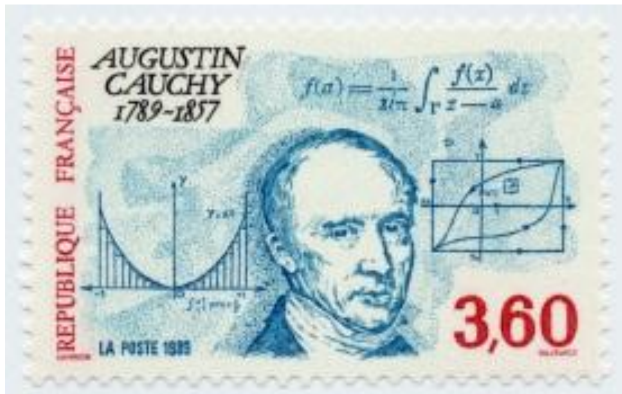
WORKSHEET XIII

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*.

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

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

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

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

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

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

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

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

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

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

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

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

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