APPENDIX

[1]
from Geometric series to Mercator series :

$$\sum_{k=0}^{x} n^k = 1 + n + n^2 + ... + n^x = \frac{1-n^{x+1}}{1-n}$$

$$\frac{1}{1+n} = 1 - n + n^2 - n^3 + ... \quad | \quad |n| < 1 \quad , \quad x \to +\infty$$

$$\int_0^x \frac{dn}{1+n} = \int_0^x \frac{(1+n)^{\prime}}{1+n} dn = \int_0^x (1 - n + n^2 - n^3 + ...)\, dn$$

$$\Big[\ln|1+n|\Big]_0^x = \int_0^x dn - \int_0^x n\, dn + \int_0^x n^2 dn - \int_0^x n^3\, dn + ...$$

$$\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + ... = \sum_{n=1}^{+\infty} \frac{(-1)^{n+1} x^n}{n}$$