Initial value theorem

In mathematical analysis, the **initial value theorem** is a theorem used to relate frequency domain expressions to the time domain behavior as time approaches zero.[1]

It is also known under the abbreviation IVT.

Let

$$F(s) = \int_0^\infty f(t)e^{-st}\,dt$$

be the (one-sided) Laplace transform of $f(t)$. The initial value theorem then says[2]

$$\lim_{t \to 0} f(t) = \lim_{s \to \infty} sF(s).$$

Notes

[1] http://fourier.eng.hmc.edu/e102/lectures/Laplace_Transform/node17.html

[2] Robert H. Cannon, *Dynamics of Physical Systems*, Courier Dover Publications, 2003, page 567.

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