

# Initial value theorem

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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.<sup>[1]</sup>

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  $\mathcal{L}\{f\}$ . The initial value theorem then says<sup>[2]</sup>

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

## Notes

[1] [http://fourier.eng.hmc.edu/e102/lectures/Laplace\\_Transform/node17.html](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.

# Article Sources and Contributors

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