

A note on Stieltjes Transform

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Dedicated to Prof. Hari M. Srivastava on his 75th birth anniversary

Abstract: In this paper an attempt has been made to discuss about the Stieltjes transform, its properties and its generalization.

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1. Introduction

The Stieltjes transform comes out naturally by repeated applications of Laplace transform. If

$$g(s) = \int_0^{\infty} e^{-su} \Phi(u) du,$$

where

$$\Phi(u) = \int_0^{\infty} e^{-ut} g(t) dt$$

Then

$$\begin{aligned} g(s) &= \int_0^{\infty} e^{-su} \left\{ \int_0^{\infty} e^{-ut} g(t) dt \right\} du \\ &= \int_0^{\infty} g(t) \left\{ \int_0^{\infty} e^{-(s+t)u} du \right\} dt \\ &= \int_0^{\infty} \left[\frac{e^{-(s+t)u}}{(s+t)} \right]_0^{\infty} g(t) dt \end{aligned}$$