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INTEGRATION BY DIFFERENTIATION

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Dedicated to Prof. M.A. Pathan on his 75^{th} birth anniversary

Abstract: We employ an expression for the Laplace transform, based in integration by differentiation, to deduce the Post-Widders formula for the inversion of this transform. Besides, we apply the Kempf et al process to deduce the Lanczos generalized derivative.

Keywords and Phrases: Inversion of the Laplace transform, Post-Widders formula, Orthogonal derivative, Integration by differentiation, Lanczos derivative.

Mathematics Subject Classification: 44A10.

1. Introduction

If we know the Laplace transform [1]:

$$F(s) = \int_0^\infty e^{-st} f(t)dt, \tag{1}$$

the aim is to determine f(t); in [2] was obtained the following formula to do the integration in (1) via differentiation:

$$F(s) = f\left(-\frac{d}{ds}\right)\frac{1}{s} \tag{2}$$