Ghoshian condensation and its inverse

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Abstract
In this paper, I describe the mathematics of Ghoshian condensation and its inverse.
The paper ends with "The End"

Introduction

Ghoshian condensation is a mathematical fact. In this paper, I describe the mathematics of Ghoshian condensation and its inverse.

Ghoshian condensation

Let

$$g(x) = \alpha + \beta x + \chi \exp(\alpha + \beta x) + \delta$$

where α, β, χ and δ are arbitrary constants.

Then, for arbitrary constants a, b, c, d and e

and

$$f = \frac{-2a\beta^2 - 2a\beta^2\chi e^{\alpha+\beta x} - 2\alpha b\beta - 2b\beta\delta - 2b\beta\chi e^{\alpha+\beta x} - 2b\beta^2 x + \beta^2 cd^2 + 2c\chi e^{\alpha+\beta d} + 2\alpha\beta cd + 2\beta cd\delta - \beta^2 ce^2 - 2c\chi e^{\alpha+\beta e} - 2\alpha\beta ce - 2\beta c\delta e}{2\beta}$$

,

we have

$$a\frac{\partial g(x)}{\partial x} + bg(x) + c\int_d^e g(x)\,dx + f = 0$$

Inverse of Ghoshian condensation

Let f be an arbitrary constant.

Then, for the same $g(x)$,

$$x = -\frac{2a\beta^2 + 2b\beta W\left(\frac{\chi(a\beta+b)\exp\left(\alpha - \frac{a\beta+\alpha b+b\delta-\frac{1}{2}\beta cd^2-\frac{c\chi e^{\alpha+\beta d}}{\beta}-\alpha cd-c\delta d+\frac{1}{2}\beta ce^2+\frac{c\chi e^{\alpha+\beta e}}{\beta}+\alpha ce+c\delta e+f}{b}\right)}{b}\right) + 2\alpha b\beta + 2b\beta\delta + \beta^2(-c)d^2 - 2c\chi e^{\alpha+\beta d} - 2\alpha\beta cd - 2\beta cd\delta + \beta^2 ce^2 + 2c\chi e^{\alpha+\beta e} + 2\alpha\beta ce + 2\beta c\delta e + 2\beta f}{2b\beta^2}$$

where W(z) is the ProductLog function

satisfies

$$a\frac{\partial g(x)}{\partial x} + bg(x) + c\int_d^e g(x)\,dx + f = 0$$

The End