

## On some sum form functional equations related to information theory

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### Abstract

This paper deals with some sum form functional equations related to the Shannon entropy and the nonadditive entropies of degree  $\alpha$ .

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### 1. Introduction

For  $n = 1, 2, 3, \dots$ , let

$$\Gamma_n = \left\{ (p_1, \dots, p_n) : p_i \geq 0, i = 1, \dots, n; \sum_{i=1}^n p_i = 1 \right\}$$

denote the set of all  $n$ -component complete discrete probability distributions with nonnegative elements.

For  $(p_1, \dots, p_n) \in \Gamma_n$ ,  $n = 1, 2, 3, \dots$ ; the entropies

$$H_n(p_1, \dots, p_n) = - \sum_{i=1}^n p_i \log_2 p_i \quad (1.1)$$

are known as the Shannon entropies [15] with  $H_n : \Gamma_n \rightarrow \mathbb{R}$ ;  $\mathbb{R}$  denoting the set of all real numbers;  $n = 1, 2, 3, \dots$ , and  $0 \log_2 0 = 0$ . These

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