

## Estimating the polygamma functions for negative integers

### Abstract

The polygamma functions  $\psi(r)(x)$  are defined for all  $x > 0$  and  $r \in \mathbb{N}$ . In this paper, the concepts of neutrix and neutrix limit are applied to generalize and redefine the polygamma functions  $\psi(r)(x)$  for all  $x \in \mathbb{R}$  and  $r \in \mathbb{N}$ . Also, further results are given.

**Keyword:** Gamma function; Neutrices; Neutrix limits; Polygamma functions.