

The forms of half-derivatives and half-integrals for functions of the form

$$f(x) = x^k, k \in \{0, 1, 2, \dots\}$$

Half Integrals:

$$\lambda_i = J^{\frac{1}{2}} x^i$$

$$\lambda_0 = \frac{2x^{\frac{1}{2}}}{\Gamma(\frac{1}{2})}$$

$$\lambda_1 = \frac{4x^{\frac{3}{2}}}{3\Gamma(\frac{1}{2})}$$

$$\lambda_2 = \frac{16x^{\frac{5}{2}}}{15\Gamma(\frac{1}{2})}$$

$$\lambda_3 = \frac{96x^{\frac{7}{2}}}{105\Gamma(\frac{1}{2})}$$

$$\lambda_i = \frac{i!2^{i+1} x^{\frac{2i+1}{2}}}{(2i+1)!! \Gamma(\frac{1}{2})}$$

Half Derivatives:

$$\frac{d}{dx} \lambda_0 = \frac{x^{-\frac{1}{2}}}{\Gamma(\frac{1}{2})}$$

$$\frac{d}{dx} \lambda_1 = \frac{2x^{\frac{1}{2}}}{\Gamma(\frac{1}{2})}$$

$$\frac{d}{dx} \lambda_2 = \frac{8x^{\frac{3}{2}}}{3\Gamma(\frac{1}{2})}$$

$$\frac{d}{dx} \lambda_3 = \frac{48x^{\frac{5}{2}}}{15\Gamma(\frac{1}{2})}$$

$$\frac{d}{dx} \lambda_i = \frac{i!2^i x^{\frac{2i-1}{2}}}{(2i-1)!! \Gamma(\frac{1}{2})}$$