

Examples

$g(w)$	$(w-1)^2$	$-\log w$	$1-w^a$	$\frac{(w-1)^2}{1+w}$
$wg(w^{-1})$	$\frac{1}{w}(w-1)^2$	$w \log w$	$w-w^{1-a}$	$\frac{(w-1)^2}{1+w}$
$k(w)$	$\frac{w+1}{2w}$	$\frac{\log w}{w-1}$	$\frac{(1-w^a)(1-w^{1-a})}{a(1-a)(1-w)^2}$	$\frac{2}{1+w}$
$H_g(P, Q)$	$\text{Tr}(Q-P)\frac{1}{P}(Q-P)$	$\text{Tr} P(\log P - \log Q)$	$1 - \text{Tr} Q^a P^{1-a}$	$\text{Tr}(Q-P)\frac{1}{R_p + L_Q}(Q-P)$
$H_g^{\text{sym}}(P, Q)$	$\text{Tr}(Q-P)\left(\frac{1}{P} + \frac{1}{Q}\right)(Q-P)$	$\text{Tr}(P-Q)(\log P - \log Q)$		$\text{Tr}(Q-P)\frac{1}{R_p + L_Q}(Q-P)$
$M_P^g(A, B)$	$\text{Tr} A^\dagger \frac{1}{P} B + \text{Tr} A^\dagger B \frac{1}{P}$	$\text{Tr} \int_0^\infty A^\dagger \frac{1}{sI+P} B \frac{1}{sI+P} ds$		$\text{Tr} A^\dagger \frac{1}{R_p + L_P} B$
$\Omega_P^g(B)$	$\frac{1}{P} B + B \frac{1}{P}$	$\int_0^\infty \frac{1}{sI+P} B \frac{1}{sI+P} ds$		$\frac{1}{R_p + L_P} B$
$[D_g(P, Q)]^2$	??	??	??	$2 \left[1 - \text{Tr}(\sqrt{P}Q\sqrt{P})^{1/2} \right]$
	$s=0$			$s=1$

$$g(w) = \frac{(w-1)^2}{w+s}, \quad k(w) = \frac{(w+1)(1+s)^2}{2(1+ws)(w+s)}, \quad \Omega_P^g = \frac{1}{sR_p + L_P} + \frac{1}{R_p + sL_P}$$

$$\frac{w+1}{2w} \geq \frac{(w+1)(1+s)^2}{2(1+ws)(w+s)} \geq \frac{2}{1+w} \implies \frac{w+1}{2w} \geq k(w) \geq \frac{2}{1+w}$$

Commutative: $D_g(P_{\mathbf{w}}, P_{\mathbf{x}}) = 2|\sin^{-1}(|\mathbf{w}|) - \sin^{-1}(|\mathbf{x}|)|$

General Non-commutative: $2\left||\mathbf{w}| - |\mathbf{x}|\right| \leq D_g(P_{\mathbf{w}}, P_{\mathbf{x}}) \leq 2\left(\sin^{-1}(|\mathbf{w}|) + \sin^{-1}(|\mathbf{x}|)\right)$