A NOTE ON INTEGRAL TRANSFORMS

TA LI

To remove the restriction \( f_n(1) = 0 \) in my paper [1], one sets

(1) \( f_n(\sigma) = f_n(1)\sigma^n + f_n^*(\sigma) \)

and

(2) \( y_n(u) = z_n(u) + w_n(u) \),

and obtains from

(3) \[
\int_{\sigma}^{1} \frac{T_n(u/\sigma) y_n(u) \, du}{(u^2 - \sigma^2)^{1/2}} = f_n(\sigma)
\]

the equations:

(4) \[
\int_{\sigma}^{1} \frac{T_n(u/\sigma) z_n(u) \, du}{(u^2 - \sigma^2)^{1/2}} = f_n(1)\sigma^n
\]

and

(5) \[
\int_{\sigma}^{1} \frac{T_n(u/\sigma) w_n(u) \, du}{(u^2 - \sigma^2)^{1/2}} = f_n^*(\sigma).
\]

The solution of (4) is found to be

(6) \[
z_n(u) = \frac{2f_n(1)}{\pi} \frac{T_{n-1}(u)}{(1 - u^2)^{1/2}}
\]

by Lemmas 1, 2, and 3, while that of (5) is given in [1] as

(7) \[
w_n(u) = -\frac{2}{\pi} \int_{u}^{1} \frac{T_{n-1}(u/v) d[v^n f_n^*(v)]}{v^{n-1}(v^2 - u^2)^{1/2}}.
\]

Consequently, the solution of (3) is

(8) \[
y_n(u) = \frac{2f_n(1)}{\pi} \frac{T_{n-1}(u)}{(1 - u^2)^{1/2}} - \frac{2}{\pi} \int_{u}^{1} \frac{T_{n-1}(u/v) d[v^n f_n(v)]}{v^{n-1}(v^2 - u^2)^{1/2}}.
\]

REFERENCE


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