



14. $\int_{-a}^a \left(\ln \frac{A}{|x-t|} \right) y(t) dt = f(x), \quad -a \leq x \leq a.$

Solution for $0 < a < 2A$:

$$\begin{aligned} y(x) = & \frac{1}{2M'(a)} \left[\frac{d}{da} \int_{-a}^a w(t, a) f(t) dt \right] w(x, a) \\ & - \frac{1}{2} \int_{|x|}^a w(x, \xi) \frac{d}{d\xi} \left[\frac{1}{M'(\xi)} \frac{d}{d\xi} \int_{-\xi}^{\xi} w(t, \xi) f(t) dt \right] d\xi \\ & - \frac{1}{2} \frac{d}{dx} \int_{|x|}^a \frac{w(x, \xi)}{M'(\xi)} \left[\int_{-\xi}^{\xi} w(t, \xi) df(t) \right] d\xi, \end{aligned}$$

where the prime stands for the derivative and

$$M(\xi) = \left(\ln \frac{2A}{\xi} \right)^{-1}, \quad w(x, \xi) = \frac{M(\xi)}{\pi \sqrt{\xi^2 - x^2}},$$

References

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