

4.
$$\int_0^x y(t)y(x-t) dt = A\sin(\lambda x).$$

Solutions:

$$y = \pm \sqrt{A\lambda} J_0(\lambda x),$$

where $J_0(z)$ is the Bessel function.

Reference

Polyanin, A. D. and Manzhirov, A. V., Handbook of Integral Equations, CRC Press, Boca Raton, 1998.

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http://eqworld.ipmnet.ru/en/solutions/ie/ie0504.pdf