

38.
$$y(x) + y(\sqrt{a^2 - x^2}) = b$$
, $0 \le x \le a$.

Solution:

$$y(x) = \frac{1}{2}b + \Phi(x, \sqrt{a^2 - x^2}),$$

where $\Phi(x, z) = -\Phi(z, x)$ is any antisymmetric function of two arguments.

Reference

Polyanin, A. D. and Manzhirov, A. V., Handbook of Integral Equations: Exact Solutions (Supplement. Some Functional Equations) [in Russian], Faktorial, Moscow, 1998.

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http://eqworld.ipmnet.ru/en/solutions/fe/fe1138.pdf