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An interval method is developed for finding optimal solutions of global optimization problem over a bounded interval domain subject to one additional special constraint (such as a linear or quadratic equation or inequality constraint). The main feature of our method is its ability to test any subdomain's feasibility and to locate a feasible point if the feasible set within the subdomain is nonempty. This feature allows our interval method to improve upper bounds of the best objective function value faster than standard interval methods where feasible samples in subdomains are not targeted. The feasibility of our selected samples will be proved and numerical results are provided to demonstrate the effectiveness of this method. (Received September 16, 2013)