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*Improved Hardy Inequalities with Exact Remainder Terms*

Hardy inequalities play extremely important roles in analysis, probability and partial differential equations. We set up several identities that imply some versions of the Hardy type inequalities. These inequalities give a straightforward understanding of several Hardy type inequalities as well as the nonexistence of nontrivial optimizers. These identities include adding the exact terms of Hardy inequalities and its improved version on bounded domains and the exact reminders of improved versions of Hardy-inequalities with  $N$ -dimensional Bessel pair on  $(0, R)$