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Some New Hardy Type Inequalities and their Limiting Inequalities

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Abstract: A new necessary and sufficient condition for the weighted Hardy inequality is proved for the case $1 < p \leq q < \infty$. The corresponding limiting Pólya-Knopp inequality is also proved for $0 < p \leq q < \infty$. Moreover, a corresponding limiting result in two dimensions is proved. This result may be regarded as an endpoint inequality of Sawyer's two-dimensional Hardy inequality. But here we need only one condition to characterize the inequality whereas in Sawyer's case three conditions are necessary.



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