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We first obtain harmonic extensions to the upper half-space of distributions in the weighted spaces  $w^{n+1}D'_{L^1}$ , which are the optimal spaces of tempered distributions  $S'$ -convolvable with the classical euclidean version of the Poisson kernel. Then, we characterize those harmonic functions in the upper half-space that are Poisson integrals of distributions in this optimal class. (Received February 16, 2004)