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Two edges in a drawing of a graph are said to cross *evenly* (*oddly*) if they cross an even (odd) number of times. The Hanani-Tutte Theorem states that if a graph is drawn in the plane such that every pair of non-adjacent edges cross evenly, then the graph is planar. We prove an analogous theorem for radial drawings, which extends an earlier result for monotone drawings. A drawing of a graph is *radial* if its vertices are assigned to concentric circles  $C_1, \dots, C_k$  with common center  $c$ , and edges are drawn *radially*: every edge intersects every circle centered at  $c$  at most once. (Received February 16, 2016)