

Ingress and Graph Theory

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Ingress is Google's entry into mobile gaming in which players use GPS on their smartphones to travel to points of interest, or portals. Once near a portal a player may link a portal to another, and if a suitable region is enclosed, then claim the area contained which is marked with a field. By identifying portals with vertices and links as edges in a graph, players in the game are creating a giant planar graph. The behavior of fields, however, is a bit different than regions in graph theory, so we examine their properties to compute some bounds on planar graphs. In particular we arrive at a sharp bound on the number of 3-cycles in a planar graph and a slightly new proof that K_n is nonplanar for $n \geq 5$.