Barcelona Analysis Seminar **2025–2026**

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On Tangential and Projectively Adjacent Approach Regions

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In 1906 Fatou proved that bounded holomorphic functions on the unit disc converge a.e. on the boundary along nontangential approach regions. In 1927 Littlewood proved a "negative" result, i.e., that a.e. convergence fails for certain approach regions: More precisely, it fails for the rotationally invariant families of tangential approach regions that end curvilinearly at the boundary. The fact that tangential approach regions which end sequentially at the boundary may instead be very well conducive to a.e. convergence was understood more recently by W. Rudin (in 1979) and A. Nagel and E.M. Stein (in 1984), in contributions that provided additional and much needed insight, and that prompted the question of giving an a priori description of those families of tangential approach regions which end sequentially at the boundary and for which a.e. convergence fails. Our main result is the first one of this kind. Indeed, we prove the failure of a.e. convergence for a class of approach regions, introduced in this work, which we call projectively adjacent, that contains curvilinear approach regions as well as sequential ones. Our result recaptures the aforementioned theorem of Littlewood as well as some of the other theorems of that type, but its novelty lies in the fact that, while all previous "negative" results for tangential approach (Littlewood, 1927; Lohwater and Piranian, 1957; Aikawa, 1990-1991, and others) dealt with approach regions that either are curves or share with curves a certain topological property that excludes the possibility that they could end sequentially at the boundary, our "negative" result deals with a class of approach regions that contains both the curvilinear and the sequential ones. Hence

we present a significant extension of the class of those families of approach regions for which a.e. convergence fails.

Based on work in collaboration with Olof Svensson and Haguma Gratien.

More information at: `https://mat.uab.cat/web/seminarianalisi/`