

ABSTRACT. Any elliptic region is an example of an integrable domain: the set of tangents to a confocal ellipse or hyperbola remains invariant under reflection across the normal to the boundary. The main result states that when  $\Omega$  is a strictly convex bounded planar domain with a smooth boundary and is integrable near the boundary, its boundary is necessarily an ellipse. The proof is based on the fact that ellipses satisfy a certain “transitivity property”, and that this characterizes ellipses among smooth strictly convex closed planar curves. To establish the transitivity property, KAM theory is used with a perturbation of the integrable billiard map.