The talk will be about the verification of parts of Kudla's conjectures on arithmetic theta functions, in particular of their relation to derivatives of Eisenstein series in arbitrary dimensions. This approach uses an extended Arakelov theory, the theory of Borcherds products, and a functorial theory of integral canonical models of toroidal compactifications of Shimura varieties. Kudla's conjectures arose to conceptually understand the mechanism in Gross- and Zagier's approach to the Birch and Swinnerton-Dyer conjecture.