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Some examples of the research approach in the education of mathematical analysis.

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Summary: We present three examples of a research approach in the education of mathematical analysis for undergraduate students. The first example is for the inverse trigonometric and hyperbolic functions and the arithmetic operations. Several identities are presented and derived using Maple. The second example is the brachistochrone problem, cycloids and the origins of calculus of variations. The third example is on fractional differential equations and numerical experiments with Mathematica.

Classification: I25 I65 I75

Keywords: inverse functions; brachistochrone problem; calculus of variations; fractional differential equations; existence results; mathematical experiments