ZMATH 1996a.00471

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On linear functions II.

Math. Comput. Educ. 29, No. 1, 32-52 (1995).

Let L(R) be the set of linear functions defined over the real number R. Once we have characterized the subset of L($\mathbb{R}$) corresponding to the subset of $\mathbb{R}^2$ generated by a function y = f(x) to be the set of lines tangent to the graph of y = g(χ) we will show how to use this result to obtain a whole family of related results. We do this by demonstrating what effect translations and dilations of the function y = f(χ) have on the function y = g(χ). It can be shown that any quadratic function can be expressed in terms of translations and dilations of y = χ^2, the upper and lower halves of any non-rotated ellipse can be expressed in terms of translations and dilations of y = $\sqrt{1-\chi^2}$, and the branches of any nonrotated hyperbola can be expressed as translations and dilations of either y = $\sqrt{1+\chi^2}$ or y = $\sqrt{\chi^2-1}$. Thus, our theorem will enable us to characterize the subsets of L($\mathbb{R}$) corresponding to the subsets of $\mathbb{R}^2$ generated by functions whose graphs are conic sections by knowing the subsets of L($\mathbb{R}$) corresponding to the subsets of $\mathbb{R}^2$ generated by the four functions y = χ^2, y = $\sqrt{1-\chi^2}$, y = $\sqrt{1+\chi^2}$, and y = $\sqrt{\chi^2-1}$. The software package Maple is used to illustrate some examples. (orig.)

Classification: G74