GeoGebra in Studying Functions

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The dynamical interactivity of the two windows, the Geometry and Algebra windows of GeoGebra [1] makes it extremely suitable for the applications in teaching functions. Using the animation, built in the slider – an extremely useful function of the software – one can easily visualize the pointwise correspondence between the points of the domain and codomain of the function, to study compound functions, the transforms of the elementary functions. Special functions (see the respective section in the MacTutor History of Mathematics at [2] can be studied and represented in a suitable form, especially the so called "technical curves", those used in engineering, altogether with their associated curves (evolute, involute, inverse, pedal curve etc.) It can be compared the power of GeoGebra and Maple in analyzing such pairs of compound functions as sin(arcsin(x)), and arcsin(sin(x)) too. Parametric and polar coordinate functions - beside using the built-in commands - can be obtained as the trace of the point moving along the curve. This way is maybe closer to the technical properties of these curves, than the classical way of representing them. Further commands, like derivatives, lower and upper sum, Taylor polynomials or the osculating circle are useful in deapening by visualisation the teaching basic notions.

The focus of this workshop is to emphasise that students have not just to learn the relevant commands in the software package available to them, they must learn to use this packages discerningly, from a base of mathematical knowledge that will inform them, when the computer solution may be unreliable. In the workshop we plan to discuss in what extent the computer solution and the interpretation of the results can replace classical methods.

REFERENCES

1. http://www.geogebra.org/cms/.
2. http://www-history.mcs.st-and.ac.uk/