Teaching Differential Equations and its Applications Using Derive 6 as a PeCas

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Lecture Proposal for the TI-Nspire & Derive Strand

ABSTRACT

In this lecture we will describe the file *diferential_equations.mth*, created in Derive 6 in order to be used in mathematical subjects which deal with differential equations, aimed at Engineering students. Such file contains a series of programs which permit to solve differential equations problems.

The programs contained in the file can be grouped within the following blocks:

- **First order differential equations**: separable equations and equations reducible to them, homogeneous equations and equations reducible to them, exact differential equations and equations reducible to them (integrating factor technique), linear equations, the Bernoulli equation, the Riccati equation.
- **First order differential equations and nth degree in y'.**
- **Generic programs to solve first order differential equations.**
- **Cauchy problems for first order differential equations.**
- **Higher orders differential equations.**
- **Cauchy problems for higher orders differential equations.**
- **Applications of differential equations.**

We will also describe in this lecture some examples of applications that have been carried out with our students of Telecommunication Engineering.

The programs have been developed using the *Display* function in order to be used as didactical tools with explications of what the programs do step by step. In this way, Derive 6 is used as a Pedagogical Cas (PeCas) or as a white-box Cas.

Finally, we include the conclusions obtained after using this file with our students and also some future work on this and other related subjects.

Keywords

Differential Equations, Derive, Pedagogical Computer Algebra System (PeCas), Mathematics Teaching Techniques, Engineering.