

Teaching the residue theorem and its applications with a CAS

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The residue theorem is one of the most interesting result in Complex Analysis which allows not only computations in \mathbb{C} , the Field of Complex Numbers, but also provides many applications in the Field of Real Numbers \mathbb{R} .

In [1] we introduced the file `RESIDUE.MTH`, developed in the CAS `DERIVE` which main objective was to provide tools for solving integration problems in Complex Analysis using the residue theorem.

In this talk we present the file `ResidueApplications.dfw`, developed also in `DERIVE`, aimed to teach the residue applications in Engineering degrees.

`ResidueApplications.dfw` can be used as a tutorial in the teaching and learning process of this topic since it provides the results step by step allowing the students to check their computations when they solve an exercise.

The programs developed in this tutorial can be grouped in the following blocks:

1. Compute of residues.
2. Compute of complex integrals using the residue theorem.
3. Applications of the residue theorem to compute integrals in \mathbb{R} :
 - (a) Trigonometric integrals.
 - (b) Improper integrals.

In previous ACA conferences we dealt with the application of the residue theorem to compute improper integrals (see [1] and [2]). In this talk, although we will present an overview of the whole tutorial, we will focus mainly in the computation of trigonometric integrals.

Keywords

Residue theorem, Trigonometric integrals, Improper integrals, Stepwise tutorial, CAS, `DERIVE`

References

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