CAS and Improper Integral - a case study

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The problem of teaching improper integrals with CAS is not new. I was considered for example in [1], [2] and [3]. During this talk examples of two improper integrals

$$\int_0^\infty \int_0^\infty \sin(x^2+y^2)dxdy \quad \text{and} \quad \int_0^\infty \int_0^\infty \cos(x^2+y^2)dxdy$$

will be considered. We will discuss the problem of convergence of these integrals. We will also analyze and discuss results obtained using different CAS and AI tools.

References

[1] G. Aguilera, J. L. Galán, M. Á. Galán, Y. Padilla, P. Rodríguez, R. Rodríguez. Teaching improper integrals with CAS, *ACA*, 2015.

[2] J. L. Galán-García, G. Aguilera-Venegas, M. Á. Galán-García, P. Rodríguez-Cielos, I. Atencia-Mc.Killop. Improving CAS capabilities: new rules for computing improper integrals, *Appl. Math. Comput.* 316 (2018), 525–540.

[3] J. L. Galán-García, G. Aguilera-Venegas, M. Á. Galán-García, P. Rodríguez-Cielos, I. Atencia-Mc.Killop, Y. Padilla-Domínguez, Yolanda, R. Rodríguez-Cielos. Enhancing Cas improper integrals computations using extensions of the residue theorem, *Adv. Comput. Math.* 45 (2019), no. 4, 1825–1841.