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Open Problems Session:

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Title: *Open search problems*

Abstract: The following problems relate to searching for integrable systems. The assignments are easy to give but solving them requires massive use of symbolic computation.

1. Find all 2D flat space Hamiltonians with a second invariant **cubic in momenta**. Some interesting results of this type have been found by Fokas, Holt, and Inozemtsev, but the complete solution is still open.
2. Solve the Yang-Baxter equation in the “**scalene**” version $A_{12}B_{13}C_{23} = C_{23}B_{13}A_{12}$. This is difficult even when restricted to the 8 vertex case.
3. Find all integrable quad equations **without the tetrahedron property** or prove that there are only trivial ones (e.g., $u_{12}u = u_1u_2$).