1142-20-230 **Michael Kinyon*** (`mkinyon@du.edu`), 2390 S York St, Denver, CO 80208. *Left braces, automated deduction, and the Yang-Baxter equation.*

A left brace $(B, +, \cdot)$ consists of an abelian group $(B, +)$, a group $(B, \cdot)$, and the identity $x(y + z) + x = xy + xz$ holds. Right braces and two-sided braces are defined in the obvious way. On a left brace $(B, +, \cdot)$, define another operation $x * y = xy - x - y$. Then B is two-sided if and only if $(B, +, *)$ is a (Jacobson) radical ring. Thus one-sided braces can be seen as a generalization of such rings.

Braces were introduced by Rump (2007) to study nondegenerate involutive set-theoretic solutions of the Yang-Baxter equation. To every left brace B, there is a corresponding solution of the YBE on B, while for any solution (X, r) of the YBE, there is a left brace structure on the structure group of (X, r).

Since first introduced, braces have been generalized in various ways: including skew braces ($(B, +)$ is just a group) and semibraces ($(B, +)$ is just a semigroup). Each generalization has brought with it nondegenerate solutions of YBE. In the meantime, two open problems emerged which lent themselves well to automated deduction. I will survey all of the above, and discuss my own contributions:

1) A brace $(B, +, \cdot)$ is two-sided if and only if $*$ is associative,

2) In a semibrace $(B, +, \cdot)$, $(B, +)$ is a completely simple semigroup. (Received September 04, 2018)