



STEP III, 1999, Q7

- 7 Let a be a non-zero real number and define a binary operation on the set of real numbers by

$$x * y = x + y + axy.$$

Show that the operation $*$ is associative.

Show that $(G, *)$ is a group, where G is the set of all real numbers except for one number which you should identify.

Find a subgroup of $(G, *)$ which has exactly 2 elements.



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