Answer on Question #78421 – Math – Algebra

Question

1. Any system of three linear equations in two variables has no solution. Is it true or false?

Solution

It is false. A system of three linear equations with two unknowns can have a solution if it is compatible.

That is, by the Rouché–Capelli theorem: A system of linear equations with n variables has a solution if and only if the rank of its coefficient matrix A is equal to the rank of its augmented matrix $[A|b]$. If there are solutions, they form an affine subspace of of dimension $n - \text{rank}(A)$. {https://en.wikipedia.org/wiki/Rouché–Capelli_theorem#cite_note-1}

Geometric representation

The graph of a linear function is a straight line. If the graphs of the three given equations intersect at the same point, then the system has a solution.