

# Homework 6: Games and Geometry

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## Problem 1.

Consider the system of equations:

$$\begin{cases} *x + *y = 0 \\ *x + *y = 0 \end{cases}$$

Two players take turns replacing the stars with real numbers. The goal of the first player is to make the system have no nontrivial solutions after all the stars have been replaced, and the goal of the second player is to make the system have at least one nontrivial solution. Who has a winning strategy? (A nontrivial solution means a solution which is not  $(0, 0)$ )

## Problem 2.

On a chord  $AR$ , two points are taken the same distance away from the midpoint  $C$  of this chord, and through these points, two perpendiculars to  $AR$  are drawn up to their intersections with the circle. Prove that these perpendiculars are congruent. Hint: Fold the diagram along the diameter passing through  $C$ .