University of Colorado
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Problem of the Month
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Let $(\mathbf{v}_1, \ldots, \mathbf{v}_{2018})$ be a sequence of 2018 vectors in $\mathbb{R}^2$ that are not necessarily distinct. Alice and Bob play the following game. Each person takes turns removing a vector from the sequence, with Alice starting first, until no vectors are left, so that both end up with 1009 vectors each. If the sum of the vectors chosen by one person has a larger length than the corresponding sum for the other person, then the former is declared the winner of the game, otherwise the game is declared a draw. Does there exist a strategy for Alice to choose her vectors so that she will not lose to Bob?