

Problem 1 (due Monday, March 1)

We say that a vector in \mathbb{R}^3 is $\{\text{rm positive}\}$ ($\{\text{rm negative}\}$) if all its coordinates are positive (resp. negative). Let v_1, v_2, v_3, v_4 be vectors in \mathbb{R}^3 such that the sum of any two of these vectors is either positive or negative. Prove that at least one of the vectors $v_1, v_2, v_3, v_4, v_1+v_2+v_3+v_4$ is either positive or negative.

The problem was solved by Chris Eppolito, Yuqiao Huang, Ashton Keith, Maxwell T Meyers, and Wei Yang. One solver provided an (almost complete) solution in which it was observed that for vectors in \mathbb{R}^3 actually one of the vectors v_1, v_2, v_3, v_4 is either positive or negative. The other solvers provided complete solutions which work for vectors in \mathbb{R}^n for any n . Detailed solutions are discussed in the following link [Solution](#).

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