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by randomusername

1   Prove that in a trapezoid with perpendicular diagonals, the product of the legs is at least as much as the product of the bases.

2   Two countries (A and B) organize a conference, and they send an equal number of participants. Some of them have known each other from a previous conference. Prove that one can choose a nonempty subset C of the participants from A such that one of the following holds:
-the participants from B each know an even number of people in C,
-the participants from B each know an odd number of participants in C.

3   Let n and k be arbitrary non-negative integers. Suppose we have drawn $2kn+1$ (different) diagonals of a convex n-gon. Show that there exists a broken line formed by $2k+1$ of these diagonals that passes through no point more than once. Prove also that this is not necessarily true when we draw only kn diagonals.