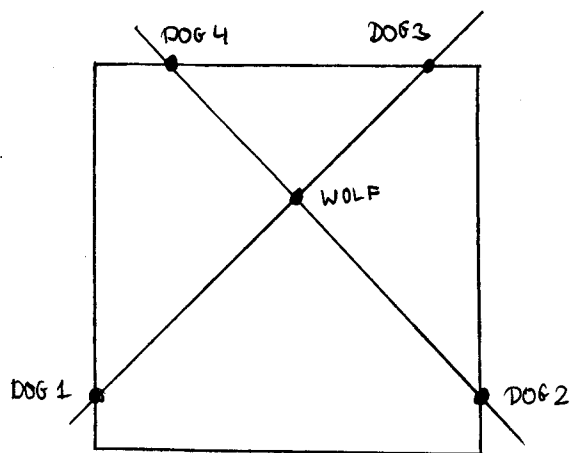
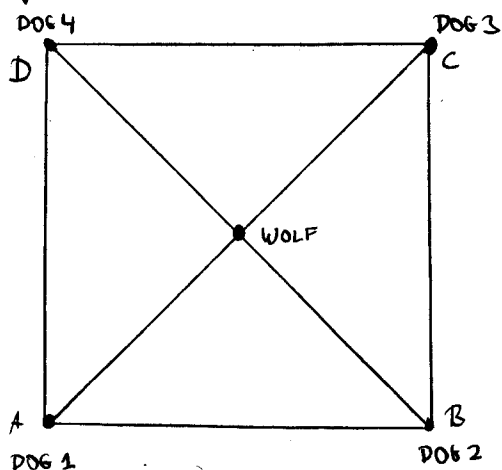


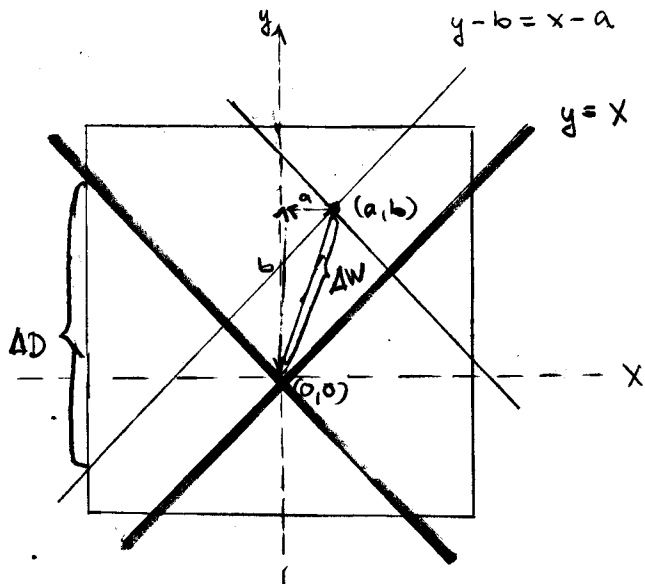
#4

Solution.

In the beginning the wolf is in the center of the square ABCD. Attach a frame of two perpendicular sticks to the wolf's back. Each dog in the corner will be attached to one end of the stick by a short leash that can move freely along the stick (see pictures). The position of the wolf uniquely determines the position of the dogs.



It is apparent that the wolf can never leave the square, since on the boundary he is always met by two dogs. We need to show that the speed of the dogs is always less or equal to 1.5 of the maximal speed of the wolf. In fact, by the computation below, we will show that the speed of any dog at any time instant is less or equal to $\sqrt{2}$ x speed of the wolf at the same time instant.



$$\Delta D = |b-a|$$

$$\Delta W = \sqrt{a^2+b^2}$$

We have

$$0 \leq (a+b)^2$$

$$a^2 - 2ab + b^2 \leq 2(a^2 + b^2)$$

$$(b-a)^2 \leq 2(a^2 + b^2)$$

$$|b-a| \leq \sqrt{2} \sqrt{a^2 + b^2}$$

$$\Delta D \leq \sqrt{2} \Delta W$$

Take the limit as $t \rightarrow 0$ to conclude

$$\frac{dD}{dt} \leq \sqrt{2} \frac{dW}{dt} \quad (t = \text{time}).$$