**Homework 5**

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1.

2.

Define:

Here: are 2D points (), and acting as lower bound or upper bound, another bound is is the slope of the linear hypoplane ().

(1) lower bound:

(2) upper bound:

Let be arbitrary points s.t.

as shown in the picture below.

Let label y = (+1, +1, -1) and assume some h = [a, b] works.

x3

x2

x1

since , must have

since , must have

As is an incresing function, then according to the statement, we should have:

But which is a contradiction.

Therefore,

3.

Technical solution:

**Main idea**: , in this way, if we want to change positive to negative one, we just need to add a

**My solution**:

(1) set the initial

(2) sort **: in an increasing order**,

(3) loop from to :

if is equal to , which means the classification is right, then, we do not change

else if is not equal to , which means the classification is wrong, then, we will **update**

and

in this way, we can make sure that with , is correctly classified.

(4) we should check, if we update , will the samples previous being checked stay correct?

The answer is **Yes**.

Previous checked samples , as we have sorted in an increasing order, that means:

in this way, if we update

they will have

since , then , n is integer

thus, , indicating that the classfication of will not change

(5) after finishing the loop, we finish updating .

at last, only **the negative values** get w updated, which means:

means corresponding to the first negative value with

means corresponding to the last negative value with

(6) Note: if we change the initial value of between 0 and , we will get a range of