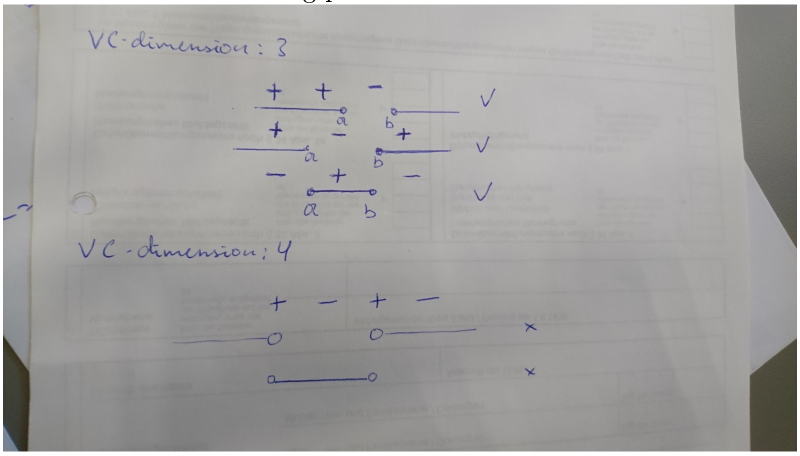
Exerise 1

a)

The VC-dimension is 3, because you can shatter all sets of size 3, but it is not possible to shatter the set $\{+-+-\}$. Like to see in the following picture:



b)

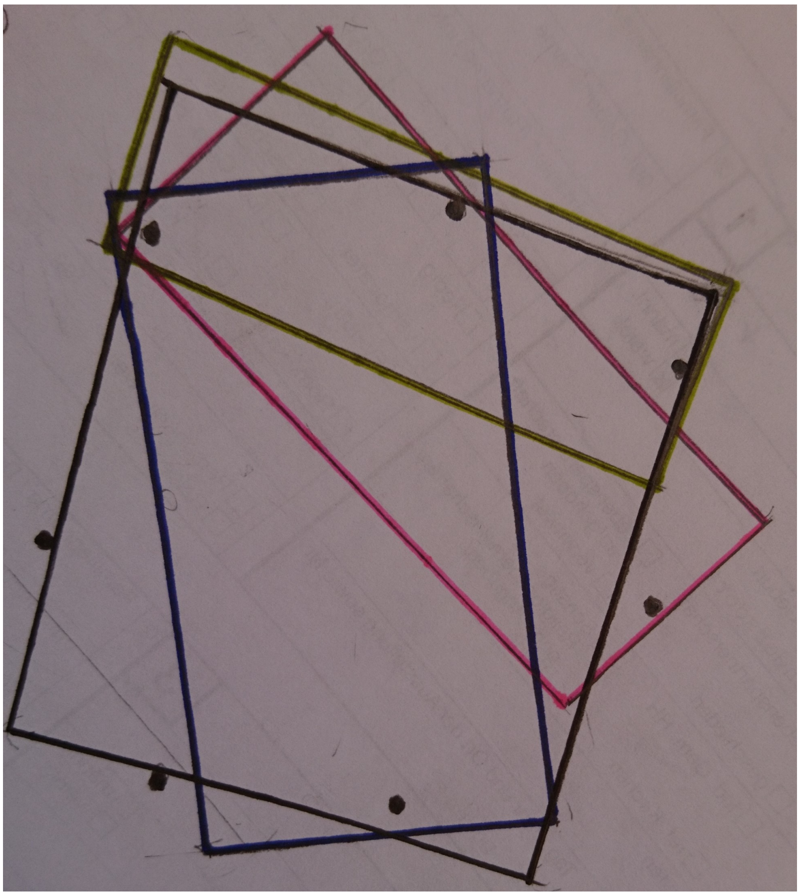
The VC-dimension is ∞,
You construct the set as following:

1. Use only primenumbers as basis for construction $B = \{p_1, \ldots, p_k\}$
2. As set X, you want to shatter, use the product of the numbers in B/p_i for a p_i
3. The p_i, that you doesn't used, is the greatest common divisor of the other numbers
4. If you want to shatter such a set, than the primenumbers you do not have in the products are the k you need to use.
5. This construction is possible for ∞ many combinations

	p_1	p_2	p_3	p_4
x_1		1	1	1
x_2	1		1	1
x_3	1	1		1
x_4	1	1	1	

Exercise 2

The first observation is, the points have to be in a circle. Wouldn't they be in a circle, there would always be a point in the middle or a little bit outside, that destroys the shattablilty. The points outside and the point in the middle would have to be of the same "classification". Also is the class of the point a little bit outside directly defined, because of the points closer to the rest.
It is possible to sort 7 points such that they are shattable. Subsets of size 1 and 2 are trivial. All other combinations you can see on the picture. The circle is symmetric, so you can turn the picture in all directions and it will still works out.



If you try for 8 points, this construction will fail already with a subset of 3. We know because of the beginning, that they have to be in a ring organized. If you have that than the following is a counterexample of a subset. You can try to draw the points a little bit different, but because of the symmetry you will always have the same problem for a subset.