SVM Optimization Practice

(find and work with a partner)

1. Incremental SVM optimization algorithm. Let $K = 4$ (initial dataset size). We will iteratively add points in order of their indices (not randomly). Run the incremental SVM optimization algorithm – at each stage, write out $S$, the support vectors, and which $\alpha$ values end up being 0. At the end, what is the equation of the separating hyperplane?

Round 1:
- $S = $
- Support vectors:
- $\alpha$'s that are 0:

Round 2:
- $S = $
- Support vectors:
- $\alpha$'s that are 0:

Round 3:
- $S = $
- Support vectors:
- $\alpha$'s that are 0:

Round 4:
- $S = $
- Support vectors:
- $\alpha$’s that are 0:
2. *Coordinate descent/ascent example.* Here we will try to minimize the function of two variables \( f(x, y) = 5x^2 - 6xy + 5y^2 \) (correction!) Initially, let \( x = -1 \) and \( y = -1 \). First, fix \( y \) and minimize the function with respect to \( x \) by taking the derivative. Then use that value to fix \( x \) and minimize the function with respect to \( y \) (you only need to do two iterations). What is the actual solution in this case?

Acknowledgements: second example by Nicoguaro on Wikipedia