Turn in your homework
— as a PDF file
— named HW06_<LastName>_<FirstName>.pdf (no accents)
— at http://tinyurl.com/ma2823-2017-hw

Question 1

Consider the following labeled data:
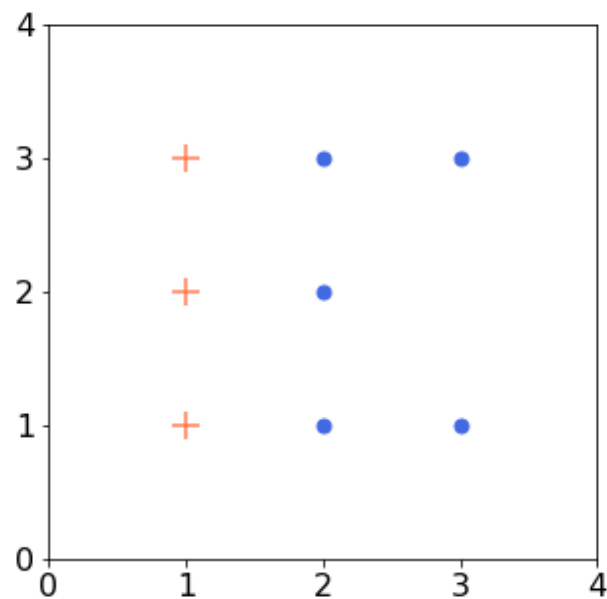
(a) Draw the decision boundary of a k-nearest-neighbors classifier that separates the orange/positive points from the blue/negative points, first for $k = 1$ and then for $k = 3$.

> **Solution:** For $k = 1$, points that are closer to a negative example than to any other point are labeled negative. The decision boundary is a vertical line at 1.5.
>
> For $k = 3$, the decision boundary deviates from this vertical line where $(3, 2)$ and $(1, 1)$ (or $(3, 3)$ and $(1, 3)$) are equidistant.
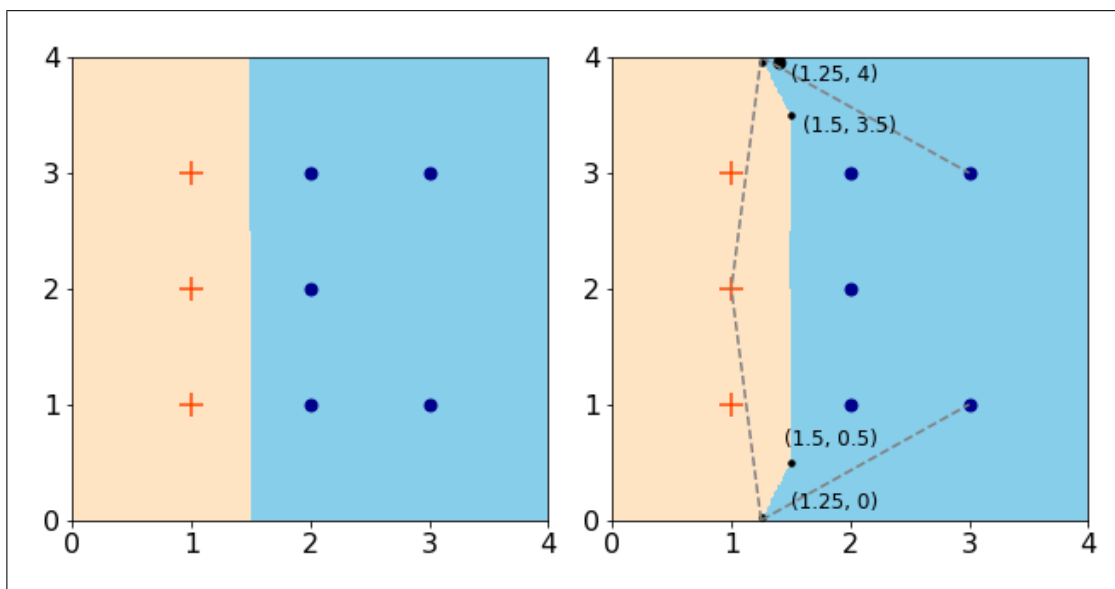
(b) How would the k-nearest-neighbors classifier label a point of coordinates $(1.3, 4)$, for $k = 1$ and for $k = 3$?

> **Solution:** According to our plots:
>
> — $k = 1$: Positive: the nearest neighbor is $(1, 3)$ which is positive.
>
> — $k = 3$: Negative: the nearest neighbors are $(1, 3)$, $(2, 3)$ and $(3, 3)$, the last two of which are negative.