Data Mining	**Fall 2021**
Tu, Th 2:00 PM – 3:15 PM	**HW 7UG**

Part 1

Each item on the list below is 1 point unless explicitly stated otherwise

Chapter 7: 6.a, 6.b, 6.c, 6.d, 6.e, 16 [2pts].

Each item on the list below is 0.5 point

Chapter 17.a, 17.b, 17.c, 17.d, 17.e, 17.f.

Part 2

Each question below is 1 bonus point. But these questions aren't optional: not answering a question at all incurs (-1pt). Incorrect answer gets you 0pts.

Consider figure below. Answer the following questions related to DBSCAN. Assume that we use the Euclidean distance between points in DBSCAN, and that radius is $eps = 1.5$ (assume square around the pint with a side 3 in which a point is tin the center of the square) and threshold for a point to be in the core is to have at least $minpts = 3$ neighbors within the radius (which includes a point itself).

1. List all the core points.
2. We say that a point x is directly density reachable from another point$y$, if x belongs to the neighborhood $N_{eps}(y)$ (i.e. in the ball of eps-radius around y) and y is a core point. Is a directly density-reachable from d?
3. We say that x is density reachable from y if there is a chain of points $x = c_1, \dots, c_k = y$ such that c_i is directly reachable from c_{i-1} for all i. Is density-reachable a symmetric relationship, i.e., if x is density-reachable from y, does it imply that y is density-reachable from x? Why or why not?
4. Is n density-reachable from e? Show the intermediate data points on the chain or the point where the chain breaks
5. Show the density-based clusters and the noise points