Task 5

1)

Start by creating a distance matrix between each point

	a	b	c	d	e	f	g	h	i	j	k	l	m
a	0	0	0	0	0	2	2	1	4	4	2	5	9
b	0	0	0	0	0	2	1	1	3	4	0	3	7
c	0	0	0	0	0	2	1	3	1	4	2	1	5
d	0	0	0	0	0	2	2	4	2	2	5	2	2
e	0	0	0	0	0	2	2	4	4	0	7	4	0
f	2	2	2	2	2	0	0	2	2	2	8	6	2
g	2	1	1	2	2	0	0	2	2	2	1	2	6
h	1	1	3	4	4	2	2	0	0	0	1	4	6
i	4	3	1	2	4	2	2	0	0	0	3	0	4
j	4	4	4	2	0	2	2	0	0	0	6	4	0
k	2	0	2	5	7	8	1	1	3	6	0	3	0
l	5	3	1	2	4	6	2	4	0	4	3	0	3
m	9	7	5	2	0	2	6	6	4	0	0	3	0
Density	9	9	10	11	9	11	12	8	8	8	7	5	6

We can see that the density of all nodes is above `minpts = 2`, and all nodes are therefor core.

Core = {a, b, c, d, e, f, g, h, i, j, k, l, m}

2)

j is density reachable from b. We can look at a path from `j` to `b`, where we first start by checking if `j` and `b` are neighbors. Looking at the matrix we see that the distance between `j` and `b` is 4. Larger then the `Eps`. Now we can look for shared neighbors.

We can see that the distance between `b` and `e`, and `j` and `e` is both 0. And this is the shared neighbor between `b` and `j`. Since `e` is a core point we can say that the path `b` → `e` → `j` completes the path of cores and `b` and `j` are density reachable.

3)

Density reachability has to be symmetrical since it relies on the distance between points. If `A` is in reach of `B`, we know for a fact that `B` is in reach of `A` if the reach distance is the same for both points. Therefor if there exists a density reachable path `A` → `D` → `B` there exists a path `B` → `D` → `A`