

# Max linkage explained:

Starting matrix:

	0	1	2	3	4
0	0	2.7	0.99	2.29	0.51
1	-	0	3.1	0.47	3.21
2	-	-	0	2.63	1.08
3	-	-	-	0	2.08
4	-	-	-	-	0

Procedure:

1. choose the lowest value between two points **0.47** and merge them into **a new cluster 5 (1+3)**
2. choose max values from new cluster to the remaining clusters

	0	2	4	5(1+3)
0	0	0.99	0.51	2.7
2	-	0	1.08	3.1
4	-	-	0	3.21
5(1+3)	-	-	-	0

$$d(C, X) = \max(d(A, X), d(B, X))$$

**C=5, A=1, B=3:**

X=0:

$$d(5,0) = \max(d(1,0), d(3,0)) = \max(2.7, 2.29) = 2.7$$

X=2:

$$d(5,2) = \max(d(1,2), d(3,2)) = \max(3.1, 2.63) = 3.1$$

X=4:

$$d(5,4) = \max(d(1,4), d(3,4)) = \max(3.21, 2.08) = 3.21$$

3. choose the lowest value between two points **0.51** and merge them into **a new cluster 6 (0+4)**
4. choose max values from new cluster to the remaining clusters

	2	5(1+3)	6(0+4)
2	-	3.1	1.08
5(1+3)	-	-	3.21
6(0+4)	-	-	-

$$d(C, X) = \max(d(A, X), d(B, X))$$

**C=6, A=0, B=4:**

X=2:

$$d(6,2) = \max(d(0,2), d(4,2)) = \max(0.99, 1.08) = 1.08$$

X=5:

$$d(6,5) = \max(d(0,5), d(4,5)) = \max(2.7, 3.21) = 3.21$$

5. choose the lowest value between two points **1.08** and merge them into **a new cluster 7**  
 - new cluster 7 has 3 clusters in total  $6(0 + 4) + 2$

6. The whole procedure:

Merge Step	Cluster 1 (Index)	Cluster 2 (Index)	Distance	Cluster Size	New Cluster Index
1	1	3	0.47725916	2	5
2	0	4	0.51783804	2	6
3	2	6	1.08380521	3	7
4	5	7	3.21646751	5	8