

20APC4904 - A.T. Dilruksha,

Index = 4904 $4+9+0+4 = 17$ $x=17$

Dilruksha = 9 $y=9$

Data Point	Coordinate
P	2, 2
Q	2.5, 2.5
R	6, 6
S	4, 5
T	5, 17
U	4, 9
V	7, 8

$$d(P, Q) = \{(2.5-2)^2 + (2.5-2)^2\}^{\frac{1}{2}} = \{0.5^2 + 0.5^2\}^{\frac{1}{2}} = 0.5$$

$$d(P, R) = \{(6-2)^2 + (6-2)^2\}^{\frac{1}{2}} = \{4^2 + 4^2\}^{\frac{1}{2}} = 5.66$$

$$d(P, S) = \{(4-2)^2 + (5-2)^2\}^{\frac{1}{2}} = \{4 + 9\}^{\frac{1}{2}} = 3.61$$

$$d(P, T) = \{(5-2)^2 + (17-2)^2\}^{\frac{1}{2}} = \{9 + 225\}^{\frac{1}{2}} = 15.29$$

$$d(P, U) = \{(4-2)^2 + (9-2)^2\}^{\frac{1}{2}} = \{4 + 49\}^{\frac{1}{2}} = 7.28$$

$$d(P, V) = \{(7-2)^2 + (8-2)^2\}^{\frac{1}{2}} = \{5^2 + 6^2\}^{\frac{1}{2}} = \{25 + 36\}^{\frac{1}{2}} = 7.81$$

$$d_{(Q,R)} = \{(6-2.5)^2 + (6-2.5)^2\}^{\frac{1}{2}} = \{(3.5)^2 + (3.5)^2\}^{\frac{1}{2}} = \{21\}^{\frac{1}{2}} = 4.58 //$$

$$d_{(Q,S)} = \{(4-2.5)^2 + (5-2.5)^2\}^{\frac{1}{2}} = \{(1.5)^2 + (2.5)^2\}^{\frac{1}{2}} = \{2.25 + 6.25\}^{\frac{1}{2}} = 2.91 //$$

$$d_{(Q,T)} = \{(5-2.5)^2 + (17-2.5)^2\}^{\frac{1}{2}} = \{(2.5)^2 + (15.5)^2\}^{\frac{1}{2}} = \{6.25 + 240.25\}^{\frac{1}{2}} = \{246.5\}^{\frac{1}{2}} = 15.70 //$$

$$d_{(Q,U)} = \{(4-2.5)^2 + (5-2.5)^2\}^{\frac{1}{2}} = \{(1.5)^2 + (2.5)^2\}^{\frac{1}{2}} = \{2.25 + 6.25\}^{\frac{1}{2}} = 2.91 //$$

$$d_{(Q,V)} = \{(7-2.5)^2 + (8-2.5)^2\}^{\frac{1}{2}} = \{(4.5)^2 + (5.5)^2\}^{\frac{1}{2}} = 7.10 //$$

$$d_{(R,S)} = \{(4-6)^2 + (5-6)^2\}^{\frac{1}{2}} = \{4 + 1\}^{\frac{1}{2}} = 2.23 //$$

$$d_{(R,T)} = \{(6-5)^2 + (6-17)^2\}^{\frac{1}{2}} = \{1 + 121\}^{\frac{1}{2}} = 11.04 //$$

$$d_{(R,U)} = \{(6-4)^2 + (6-9)^2\}^{\frac{1}{2}} = \{4 + 9\}^{\frac{1}{2}} = 3.60 //$$

$$d_{(R,V)} = \{(6-7)^2 + (6-8)^2\}^{\frac{1}{2}} = \{1 + 4\}^{\frac{1}{2}} = 2.23 //$$

$$d_{(s,r)} = \{(4-5)^2 + (5-17)^2\}^{\frac{1}{2}} = \{(1+144)\}^{\frac{1}{2}} = 12.04$$

$$d_{(s,u)} = \{(4-4)^2 + (5-9)^2\}^{\frac{1}{2}} = \{0+16\}^{\frac{1}{2}} = 4$$

$$d_{(s,v)} = \{(4-7)^2 + (5-8)^2\}^{\frac{1}{2}} = \{9+9\}^{\frac{1}{2}} = 4.24$$

$$d_{(t,u)} = \{(5-4)^2 + (17-8)^2\}^{\frac{1}{2}} = \{(1+81)\}^{\frac{1}{2}} = 9.05$$

$$d_{(t,v)} = \{(5-7)^2 + (17-8)^2\}^{\frac{1}{2}} = 9.21$$

$$d_{(u,v)} = \{(4-7)^2 + (9-8)^2\}^{\frac{1}{2}} = \{9+1\}^{\frac{1}{2}} = 3.16$$

	P	Q	R	S	T	u	v
P	0	0.71	5.65	3.60	15.25	7.28	7.81
Q	0.71	0	4.95	2.92	14.71	6.67	7.12
R	5.65	4.95	0	2.23	11.05	3.60	2.24
S	3.60	2.92	2.23	0	12.05	4	4.24
T	15.25	14.71	11.05	12.05	0	8.06	9.21
u	7.28	6.67	3.60	4	8.06	0	3
v	7.81	7.12	2.24	4.24	9.21	3	0

Single link = 0.71 (p,q)

Clusters = (p,q), R, S, T, u, v

	PQ	R	S	T	U	V
PQ	0	4.95	2.92	14.71	6.67	7.12
R	4.95	0	2.23	11.05	3.60	2.234
S	2.92	2.23	0	12.05	4	4.24
T	14.71	11.05	12.05	0	8.06	9.21
U	6.67	3.60	4	8.06	0	3
V	7.12	2.24	4.24	9.21	3	0

Single linkage = 2.23 (S, R)

Cluster = (P, Q), (R, S), T, U, V

	PQ	RS	T	U	V
PQ	0	2.92	14.71	6.67	7.12
RS	2.92	0	11.05	3.60	2.24
T	14.71	11.05	3.60 0	8.06	9.21
U	6.67	3.60	2.24 8.06	0	3
V	7.12	2.24	9.21	3	0

Single linkage 2.24 [(R, S), V]

Clusters = (P, Q) & [(R, S, V)], T, U

	PQ	RSV	T	u
PQ	0	2.92	14.71	6.67
RSV	2.92	0	9.21	3
T	14.71	9.21	0	9.21
u	6.67	3	9.21	0

Single linkage = 2.92 [(P,Q), (R,S,V)]

Clusters = (P,Q), (R,S,V) T u

	PQRSV	T	u
PQRSV	0	9.21	3
T	9.21	0	9.21
u	3	9.21	0

