Dendrogram using Complete Linkage
Rescaled Distance Cluster Combine
CASE 0 5 10 15 20 25
Label Num

Table 7.6 **Ward's Method**

Cluster Solution	Members in Cluster 1	2	3	4	5	ESS
(a) All Possible Five-Cluster Solutions						
1	S1,S2	S3	S4	S5	S6	1.0
2	S1,S3	S2	S4	S5	S6	90.5
3	S1,S4	S2	S3	S5	S6	110.5
4	S1,S5	S2	S3	S4	S6	312.5
5	S1,S6	S2	S3	S4	S5	410.5
6	S2,S3	S1	S4	S5	S6	72.5
7	S2,S4	S1	S3	S5	S6	90.5
8	S2,S5	S1	S3	S4	S6	278.5
9	S2,S6	S1	S3	S4	S5	372.5
10	S3,S4	S1	S2	S5	S6	1.0
11	S3,S5	S1	S2	S4	S6	68.0
12	S3,S6	S1	S2	S4	S5	125.0
13	S4,S5	S1	S2	S3	S6	53.0
14	S4,S6	S1	S2	S3	S5	106.0
15	S5,S6	S1	S2	S3	S4	13.0
(b) All Possible Four-Cluster Solutions						
1	S1,S2,S3	S4	S5	S6		109.333
2	S1,S2,S4	S3	S5	S6		134.667
3	S1,S2,S5	S3	S4	S6		394.667
4	S1,S2,S6	S3	S4	S5		522.667
5	S1,S2	S3,S4	S5	S6		2.000
6	S1,S2	S3,S5	S4	S6		69.000
7	S1,S2	S3,S6	S4	S5		126.000
8	S1,S2	S4,S5	S3	S6		54.000
9	S1,S2	S4,S6	S3	S5		107.000
10	S1,S2	S5,S6	S3	S4		14.000

	INC.	EDUC.
S_1	5	5
S_2	6	6
S_3	15	14
S_4	16	15
S_5	25	20
S_6	30	19

CENTROID $\{S_1, S_2\}$ IS $\frac{1}{2}(5+6, 5+6) = (5.5, 5.5)$

$\{S_3, S_4\}$ IS $\frac{1}{2}(15+16, 14+15) = (15.5, 14.5)$

$$ESS(\{S_3, S_4\}) = (15-15.5)^2 + (14-14.5)^2 + (16-15.5)^2 + (15-14.5)^2 = 1$$

CENTROID $\{S_1, S_2, S_3\}$ IS $\frac{1}{3}(5+6+15, 5+6+14) = \frac{1}{3}(26, 25)$

$$ESS(\{S_1, S_2, S_3\}) = (5-\tfrac{26}{3})^2 + (5-\tfrac{25}{3})^2 + (6-\tfrac{26}{3})^2 + (6-\tfrac{25}{3})^2 + (15-\tfrac{26}{3})^2 + (14-\tfrac{25}{3})^2$$
$$= 109.33$$

THE ESS OF THE CLUSTERS $\{S_1, S_2\}$, $\{S_3, S_4\}$, $\{S_5\}$, $\{S_6\}$ IS GIVEN BY: $ESS(\{S_1, S_2\}) + ESS(\{S_3, S_4\}) + ESS(\{S_5\}) + ESS(\{S_6\})$

$$= 1 + 1 + 0 + 0$$
$$= 2.00$$

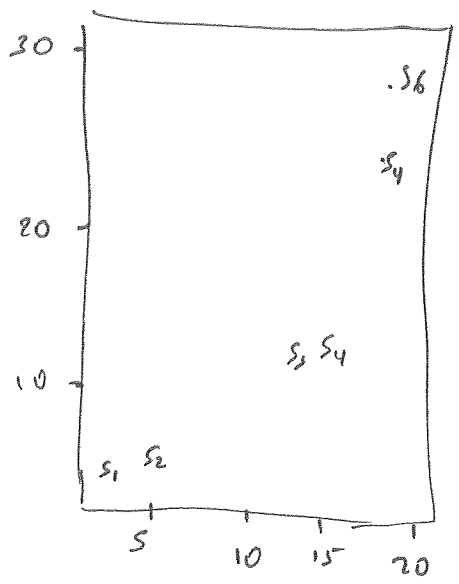
	1	2	3	4	5
1	0	.	.	.	.
2	(1)	0	.	.	.
3	2	3	0	.	.
4	8	9	10	0	.
5	11	12	13	5	0

	{1,2}	3	4	5
{1,2}	0	.	.	.
3	(3)	0	.	.
4	9	10	0	.
5	12	13	5	0

	{1,2,3}	4	5
{1,2,3}	0	.	.
4	10	0	.
5	13	(5)	0

	{1,2,3}	{4,5}
{1,2,3}	0	.
{4,5}	13	0

	COEFF.
STEP 1: {1,2}	1
STEP 2: {1,2,3}	3
STEP 3: {4,5}	5
STEP 4: {1,2,3,4,5}	13



	Inc.	Edu.
s_1	5	5
s_2	6	6
s_3	15	14
s_4	16	15
s_5	25	20
s_6	30	19

	s_1	s_2	s_3	s_4	s_5	s_6
s_1	0					
s_2	2	0				
s_3	181	145	0			
s_4	221	181	2	0		
s_5	625	557	136	106	0	
s_6	821	745	250	212	26	0.

	Inc.	Educ.
$\{s_1, s_2\}$	5.5	5.5
s_3	15	14
s_4	16	15
s_5	25	20
s_6	30	19

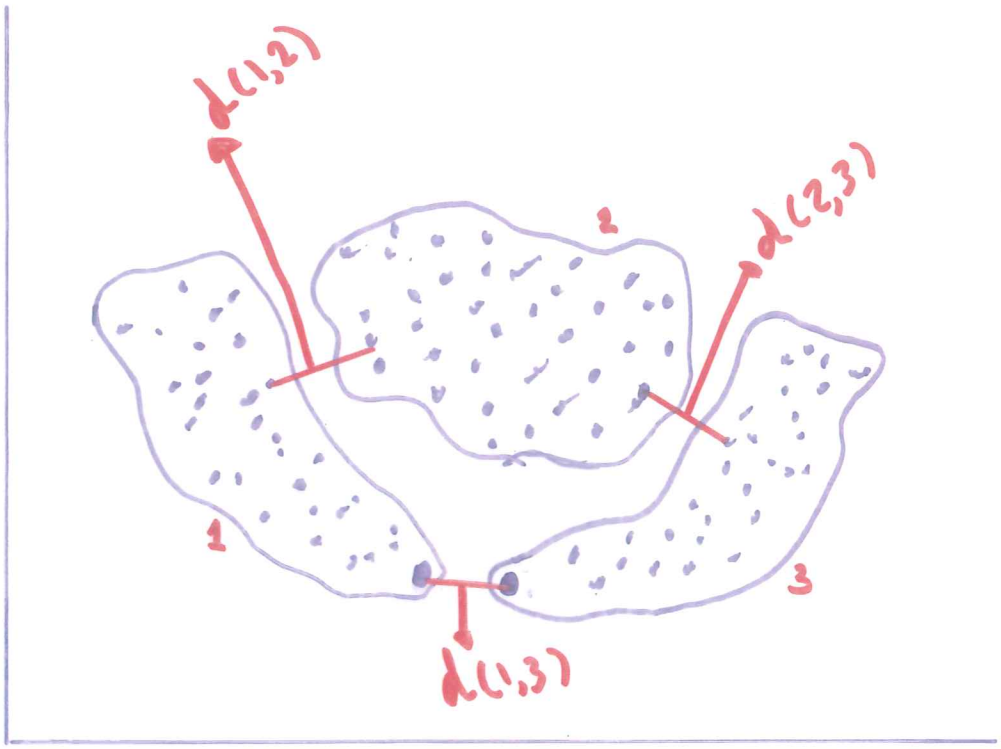
	$\{s_1, s_2\}$	s_3	s_4	s_5	s_6
$\{s_1, s_2\}$	0	.	.	.	.
s_3	162.5	0	.	.	.
s_4	200.5	(2)	0	.	.
s_5	590.5	136	106	0	.
s_6	782.5	250	212	26	0.

	Inc.	Educ.
$\{s_1, s_2\}$	5.5	5.5
$\{s_3, s_4\}$	15.5	14.5
s_5	25	20
s_6	30	19

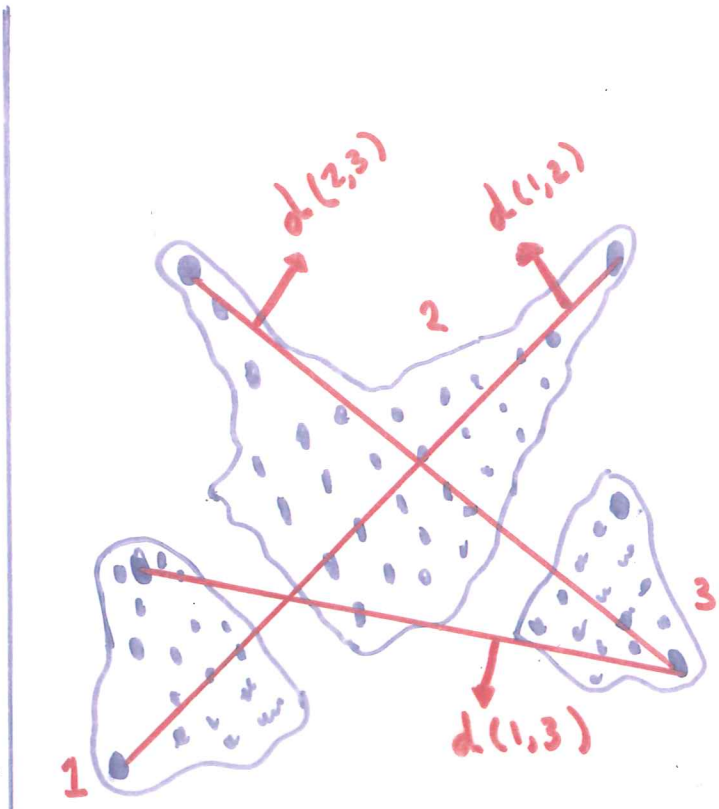
	$\{s_1, s_2\}$	$\{s_3, s_4\}$	s_5	s_6
$\{s_1, s_2\}$	0	.	.	.
$\{s_3, s_4\}$	181	0	.	.
s_5	590.5	180.5	0	.
s_6	782.5	230.50	26	0.

	Inc.	Educ.
$\{s_1, s_2\}$	5.5	5.5
$\{s_3, s_4\}$	15.5	14.5
$\{s_5, s_6\}$	27.5	19.5

	$\{s_1, s_2\}$	$\{s_3, s_4\}$	$\{s_5, s_6\}$
$\{s_1, s_2\}$	0	.	.
$\{s_3, s_4\}$	181	0	.
$\{s_5, s_6\}$	680	(169)	0



MINIMUM DISTAN.
$d(1,3)$



$d(1,2) > d(2,3) > d(1,3$

$d(1,2) > d(1,3)$

$d(2,3) > d(1,3)$

MINIMUM DISTANCE:
$d(1,3)$