#1

Matthew Nichols

Data Matrix

ID	Test-1	Test-2	Test-3
1	A	Excellent	45
2	B	Fair	22
3	C	Good	64
4	A	Excellent	28

Dissimilarity Matrix (Nominal)

	1	2	3	4
1	0			
2	1	0		
3	1	1	0	
4	0	1	1	0

Dissimilarity Matrix (ordinal)

	1	2	3	4
1	0			
2	1	0		
3	0.5	0.5	0	
4	0	1	0.5	0

numerical:

1	45
2	22
3	64
4	28

Dissimilarity Matrix (Numerical)

	1	2	3	4
1	0			
2	.55	0		
3	0.45	1	0	
4	0.4	0.14	0.86	0

$\frac{|45-22|}{64-22} = \frac{23}{42} = .55$ $\quad \frac{|64-22|}{64-22} = 1$ $\quad \frac{|22-28|}{64-22} = .14$

$\frac{|45-64|}{64-22} = 0.45$ $\quad \frac{|45-28|}{64-22} = 0.4$ $\quad \frac{|28-64|}{64-22} = 0.86$

$$d(2,1) = \frac{(1\times1) + (1\times1) + (1\times0.55)}{1+1+1} = \frac{2.55}{3} = 0.85$$

$$d(3,1) = \frac{(1\times1) + (1\times.5) + (1\times0.45)}{1+1+1} = 0.65$$

$$d(3,2) = \frac{(1\times1) + (1\times.5) + (1\times1)}{1+1+1} = 0.83$$

$$d(4,1) = \frac{(1\times0) + (1\times0) + (1\times0.4)}{1+1+1} = 0.13$$

$$d(4,2) = \frac{(1\times1) + (1\times1) + (1\times0.14)}{1+1+1} = 0.71$$

$$d(4,3) = \frac{(1\times1) + (1\times0.5) + (1\times0.86)}{1+1+1} = 0.79$$

Final Dissimilarity Matrix

	1	2	3	4
1	0			
2	0.85	0		
3	0.65	0.83	0	
4	0.13	0.71	0.79	0

#3

	Passed	Failed	Total
Attended	25 (18.94)	6 (12.06)	31
Skipped	8 (14.06)	15 (8.94)	23
Total	33	21	54

$$\chi^2 = \sum \frac{(\text{Observed} - \text{Expected})^2}{\text{Expected}}$$

$$\chi^2 = \frac{(25-18.94)^2}{18.94} + \frac{(6-12.01)^2}{12.01} + \frac{(8-14.06)^2}{14.06} + \frac{(15-8.94)^2}{8.94}$$

$$\chi^2 = 11.70$$

degrees of freedom: 1

critical value: 3.841

Reject the null hypothesis