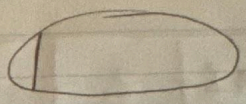

1)

Define $A(t)$ to be the area of region X on left side of the line. Since X is bounded, as we move from one side to another $A(t)$ will change continously from 0 to ~~total~~ area of X

Because $A(t)$ is continuous there is a position t where

$$A(t) = r \cdot A(\text{total}) \quad \text{and where } r = \frac{1}{5}$$

Then $A(t) = \frac{1}{5} A(\text{total})$ while the other side $\frac{4}{5} A(\text{total})$ and the ratio $\frac{\frac{4}{5}}{\frac{1}{5}} = 4$

Thus the line L divides the region so one side has four times the area of other

2)

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

P_1

From this we have 4 contiguous districts with 4 squares each

From this we get a cut edge score of: 12

Additionally, we get a spanning tree score of 4 districts × 3 edges/district = 12

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

P_2 From this we also have 4 contiguous districts with 4 squares each

From this we get a cut edge score of: 12

Additionally, we get a spanning tree score of 4 districts × 3 edges/district = 12 since they are internal edges.

Thus, we have P_1 and P_2 who have different formations but result in same cut edge score of 12 and same spanning tree score of 12!