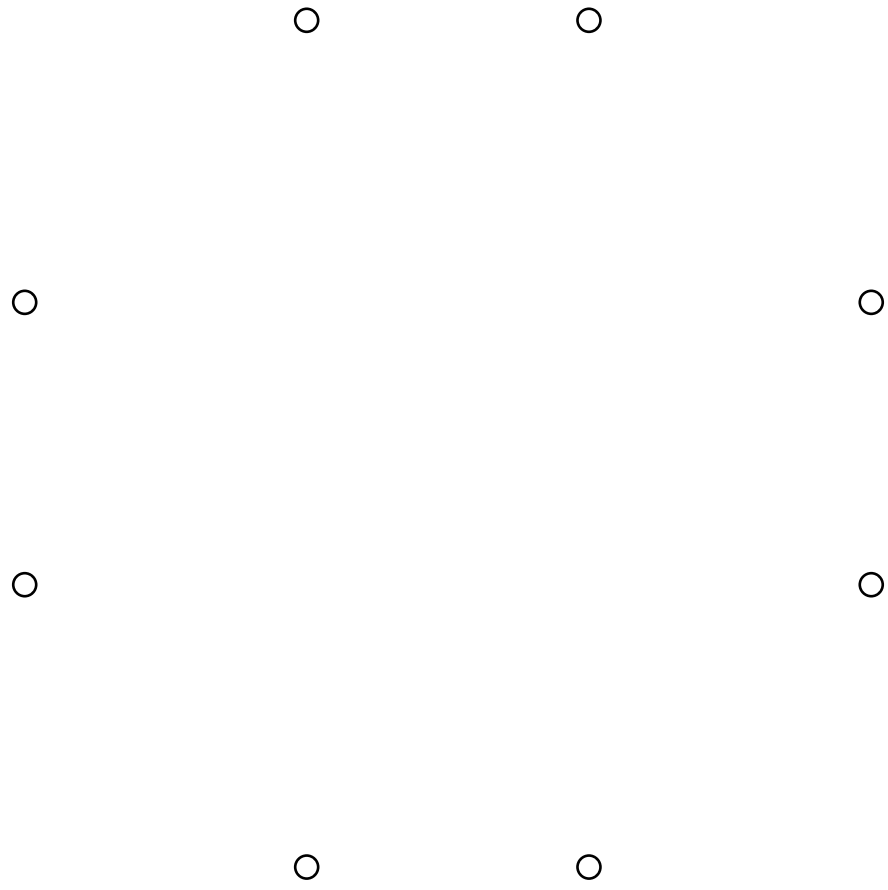
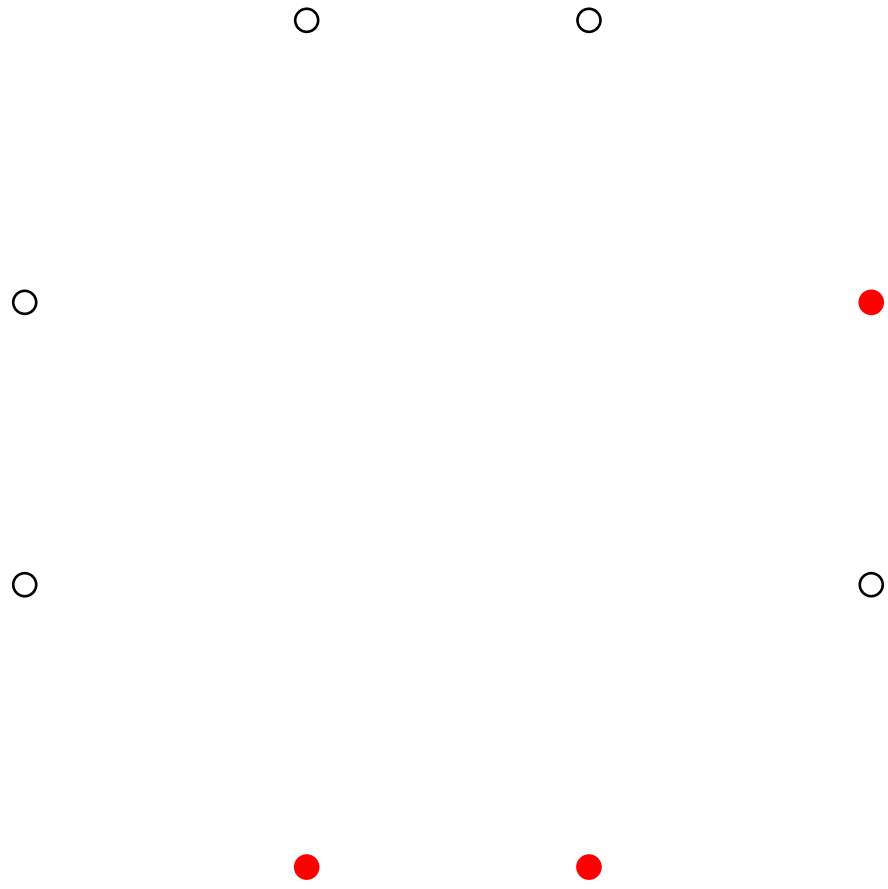
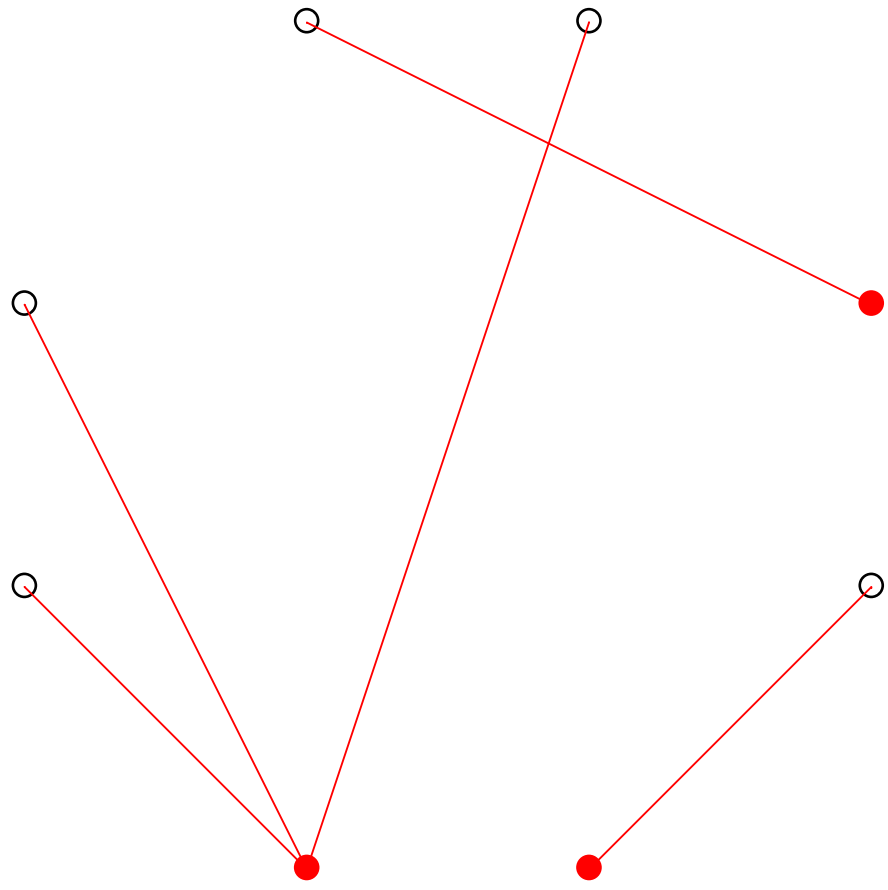
Starting position



Selected nodes = private key

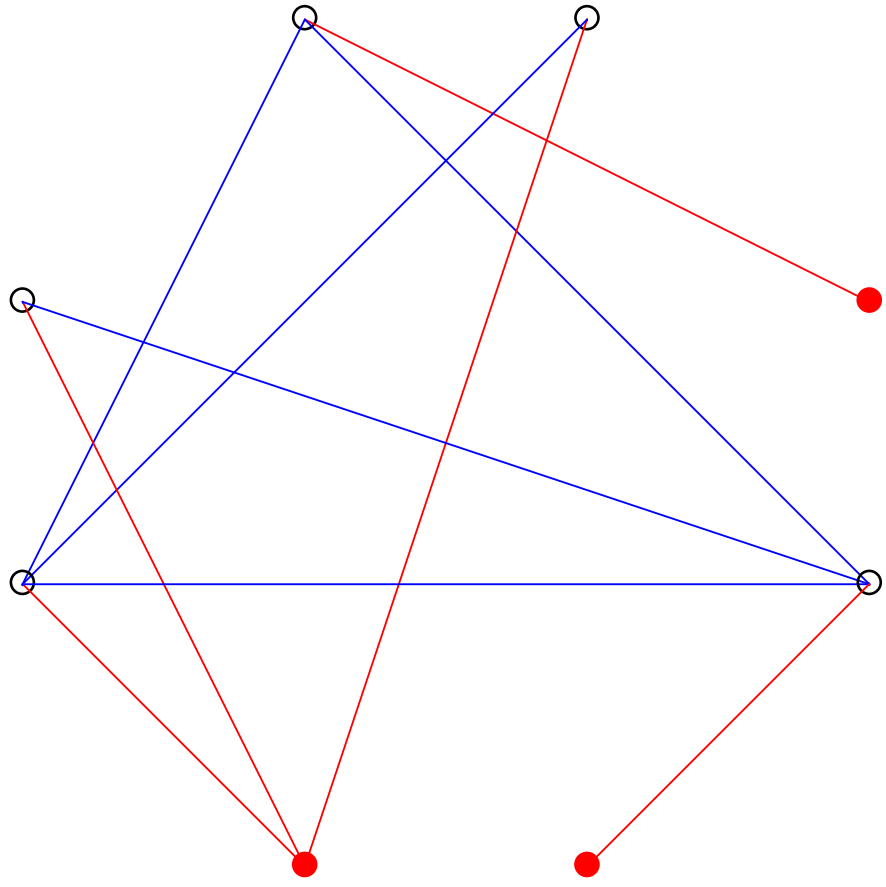


Perfect code – we'll build one



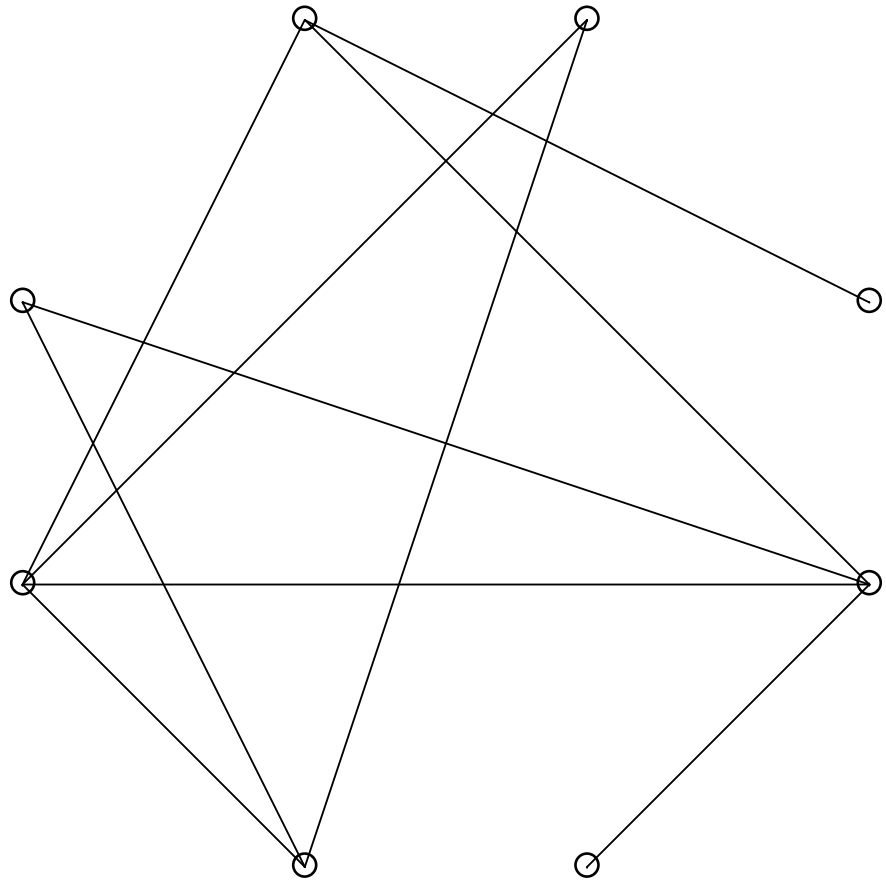
Each node is connected to exactly one selected node.
Perfect code: there exists a selection of nodes so that each node is in the neighborhood of exactly one selected node (a selected node is in its own neighborhood.)

Additional edges



To hide the structure of the selected nodes, further edges are included under the condition that they are connected to one of the selected nodes.
This gives a perfect code – proof it!

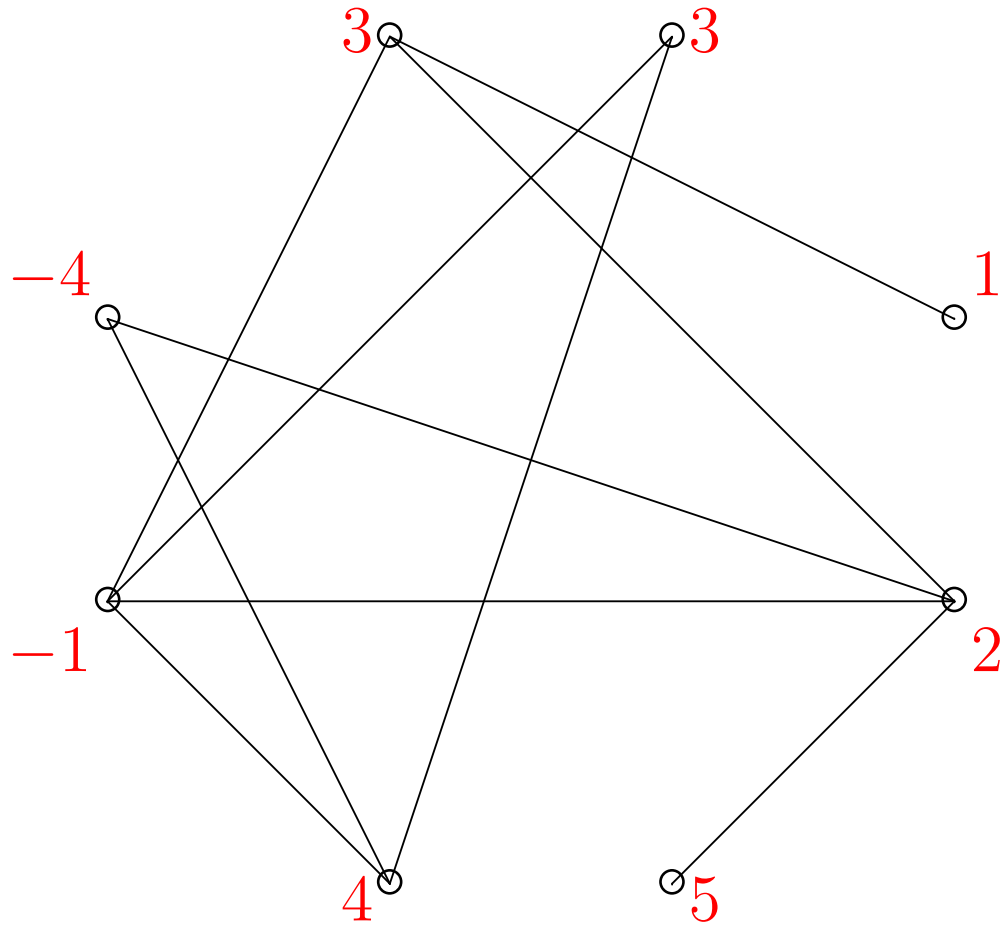
Public key



All edges, no highlighting.

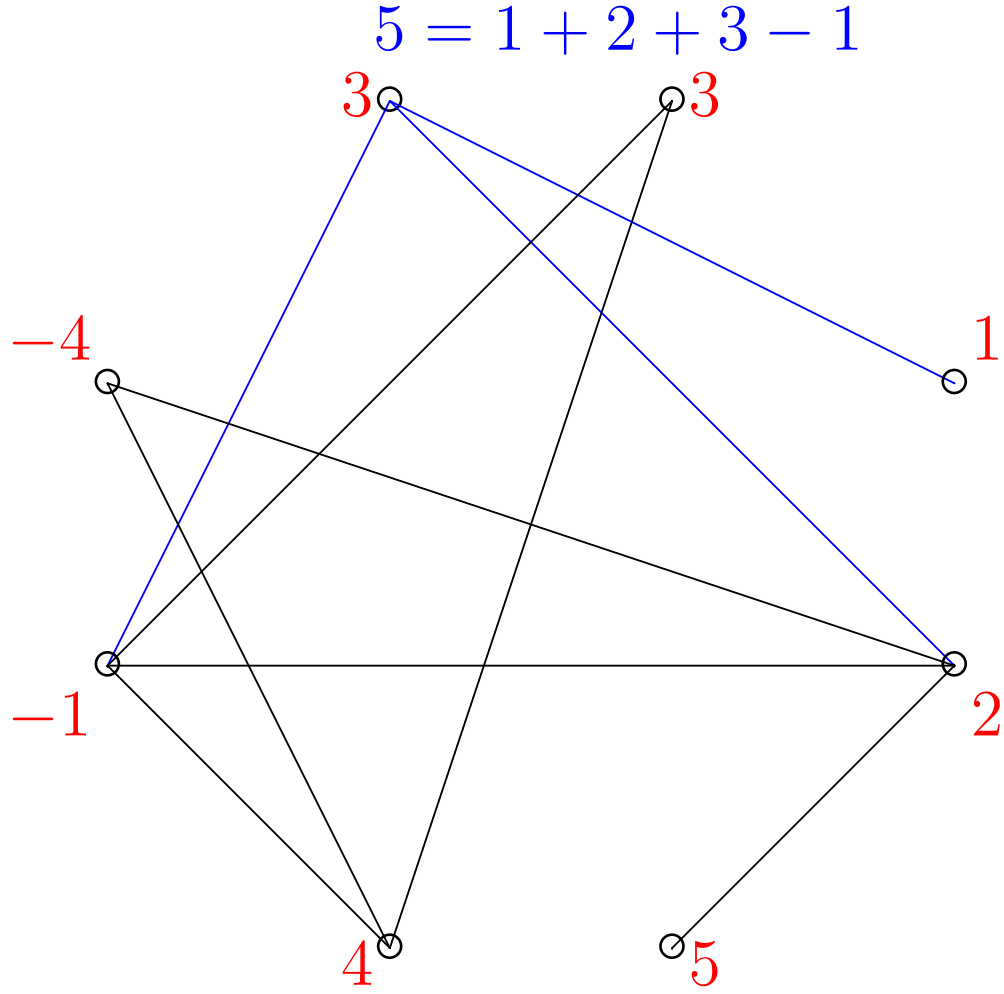
Encryption of $m = 13$

$13 = 1 + 2 + 3 - 4 + 5 + 4 + 3 - 1$. Partition 13, one share per node.



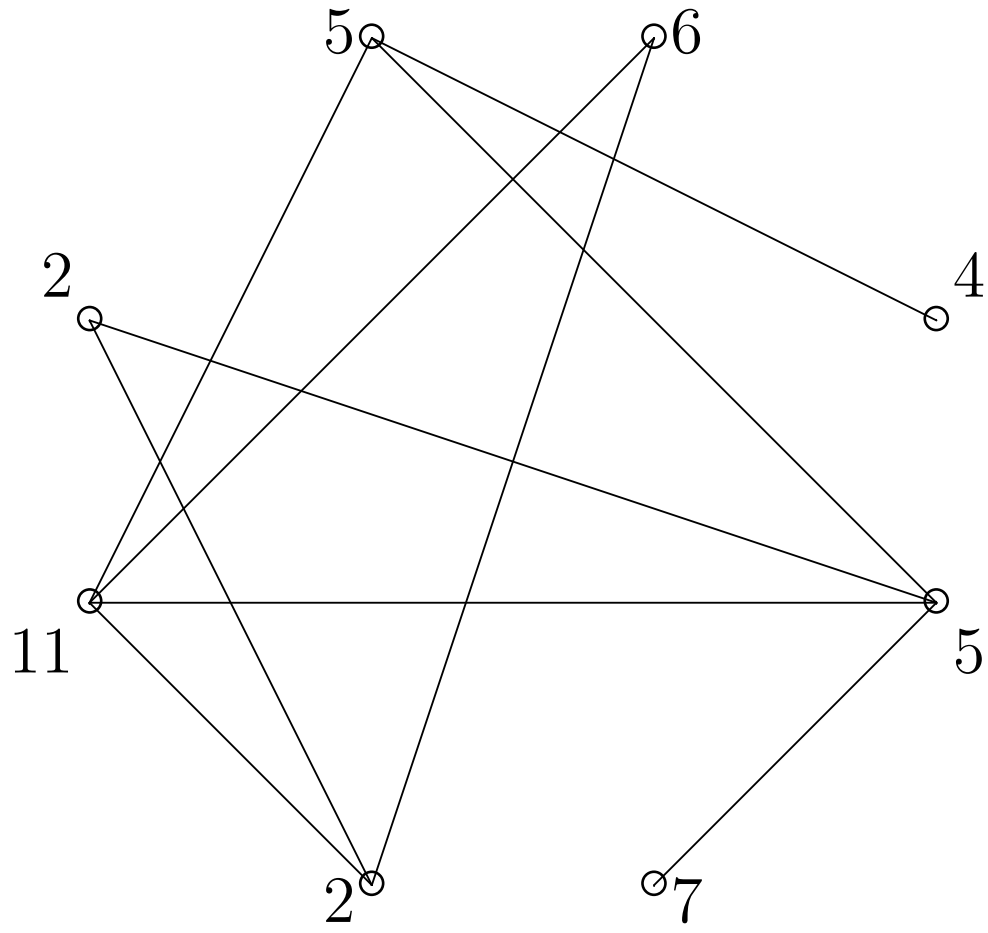
Encryption of $m = 13$

For each node compute the sum of values at all nodes at distance at most 1, i.e. the value at the node itself plus all nodes directly connected to it.



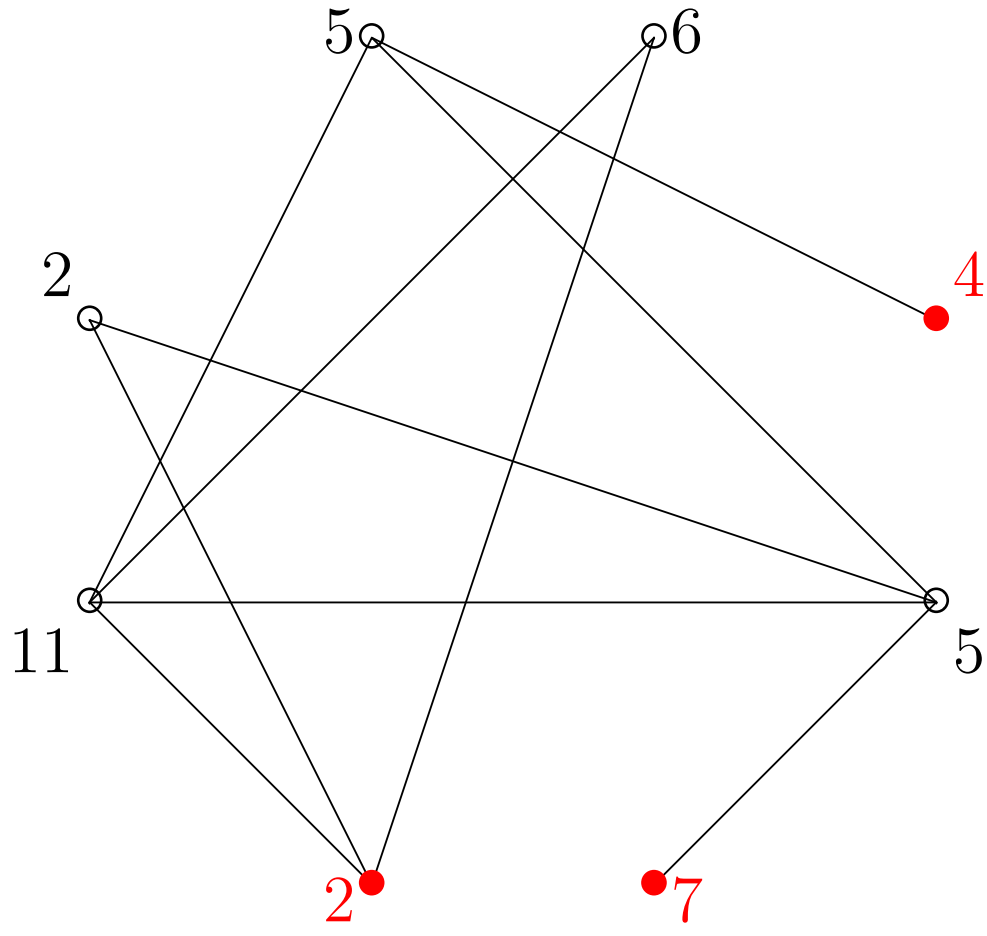
Encrypted message

For each node write the sum computed in the previous step next to it.



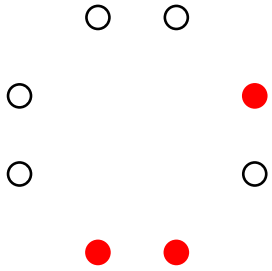
Decryption

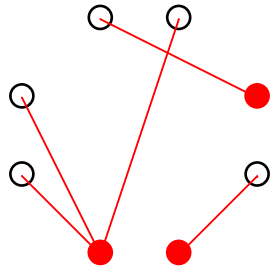
Add values at points seleted as secret key.

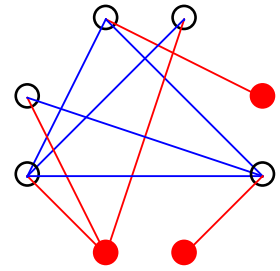


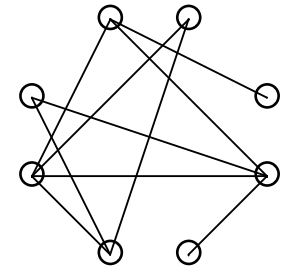
$4 + 2 + 7 = 13$. Why does this work?

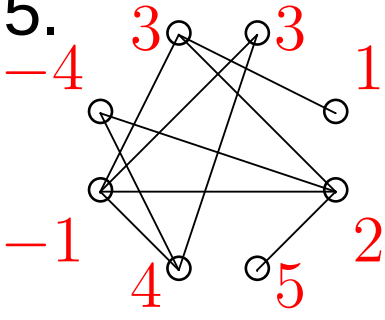
Overview

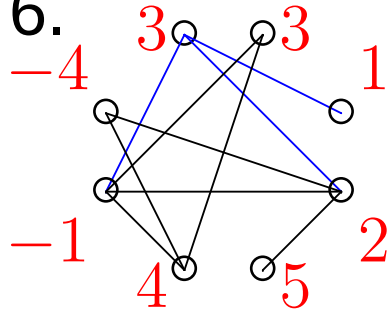
1. 

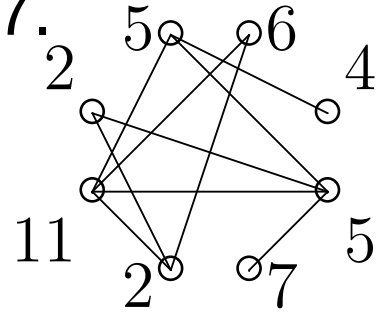
2. 

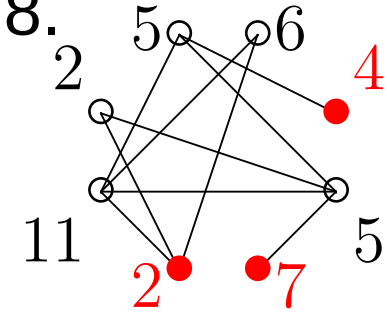
3. 

4. 

5. 

6. 

7. 

8. 

A: 1. sheet: secret key (1), 2. sheet: public key (4) decryption (8)

intermediate steps (1–3)

B: 1. sheet: computations (5–6) 2.sheet: “black” numbers next to nodes (7)