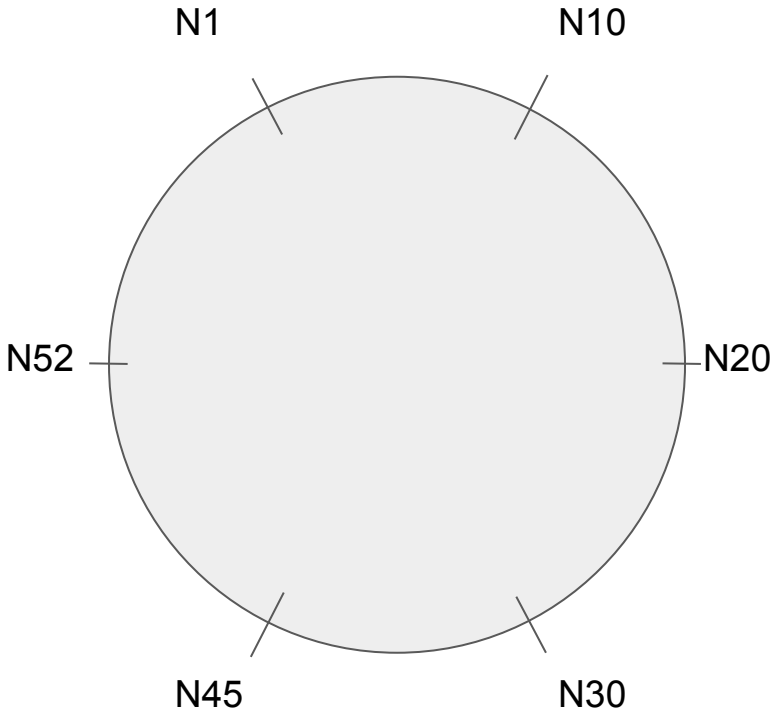
Suppose that 6 peers with ids 1, 10, 20, 30, 45, and 52 form a system using a Chord ring with m=6. If node 52 initiates a query for key 28, what is the list of nodes traversed by that query? Show your work.



N52's Finger Table

i	n+2^i	Node Id
0	53	N1
1	54	N1
2	56	N1
3	60	N1
4	68->4	N10
5	84->20	N20

N20's Finger Table

i	n+2^i	Node Id
0	21	N30
1	22	N30
2	24	N30
3	28	N30
4	36	N45
5	52	N52

List of nodes traversed: N52->N20->N30 (done)

Suppose a distributed system is running a gossip-style membership protocol with Tfail = 10, Tcleanup = 18. If a node A, at local time = 70, has heartbeat table

1	10300	45
2	10118	50
3	10048	60
4	10840	65

and receives a gossip massage from node B containing the table

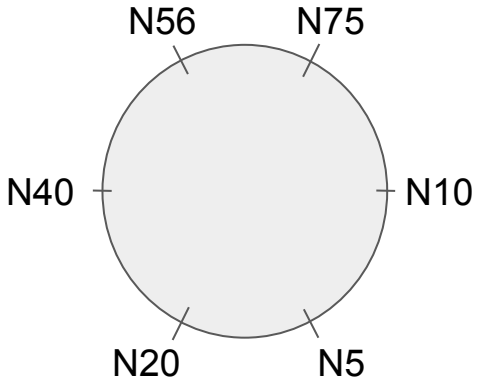
1	10310	45
2	10105	56
3	10020	63
4	11010	60

What will the updated table of A look like?

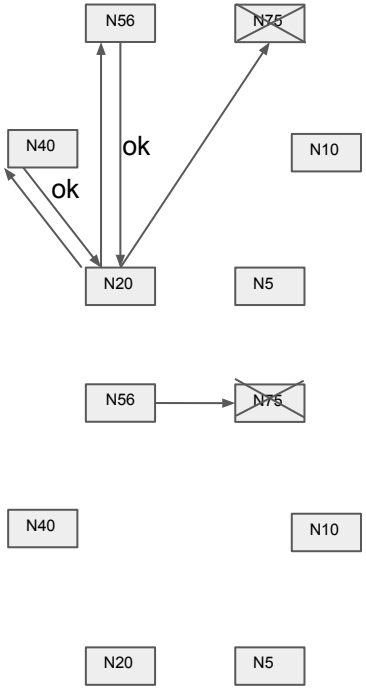
Node A's Update Table

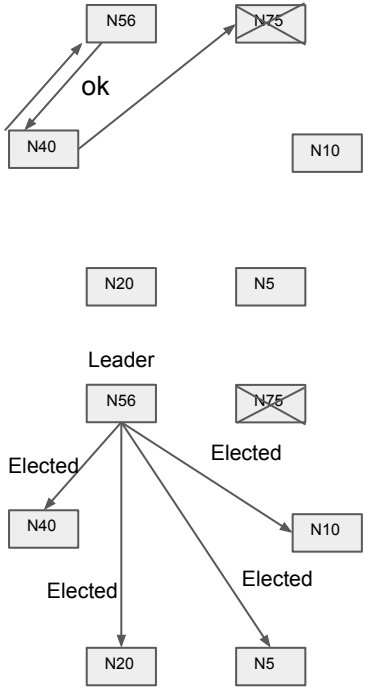
1	**10310**	**70**
2	10118	50
3	10048	60
4	**11010**	**70**

The following nodes are running the Ring Election protocol. N20 initiates a new leader election run, in order to elect the highest-id process as leader. Assuming no further failures, what is the total number of messages incurred until the protocol terminates? If these nodes are running the Bully algorithm, assume N20 is still the initiator and N75 has already failed, what is the total number of messages incurred until the protocol terminates? Show your work.



N20->N40(election 20)
N40->N56(election 40)
N56->N75(election 56)
N75->N10(election 75)
N10->N5(election 75)
N5->N20(election 75)
N20->N40(election 75)
N40->N56(election 75)
N56->N75(election 75)
N75->N10(elected 75)
N10->N5(elected 75)
N5->N20(elected 75)
N20->N40(elected 75)
N40->N56(elected 75)
N56->N75(elected 75)





Ring Election protocol message total: 15

Bully algorithm message total: 13