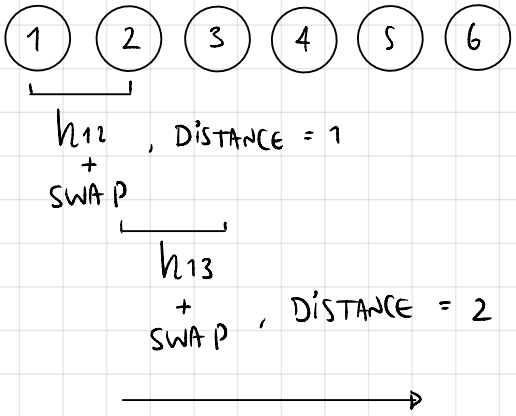
SWAP SKETCH: $H = J \sum_{i<j} e^{-\alpha |i-j|} (\hat{X}_i \hat{X}_j + \hat{Y}_i \hat{Y}_j)$

N = 6. MAYBE THERE ARE BETTER WAYS. BUT THIS WORKS.

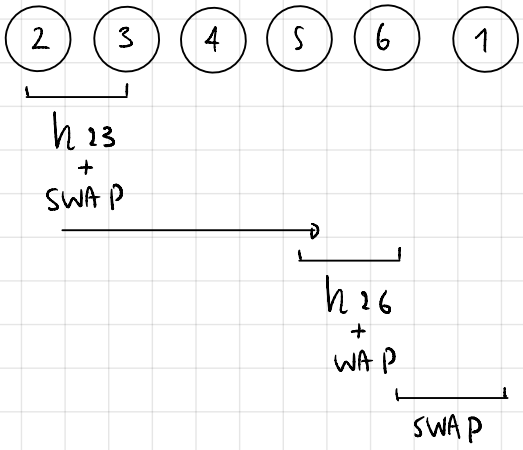
$j = 1$



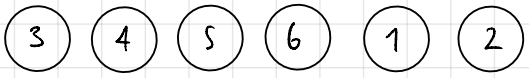
h_{12}, SWAP ✓
h_{13}, SWAP ✓
h_{14}, SWAP ✓
h_{15}, SWAP ✓
h_{16}, SWAP ✓ $(N - j) = 5$

AFTER THESE GATES

$j = 2$

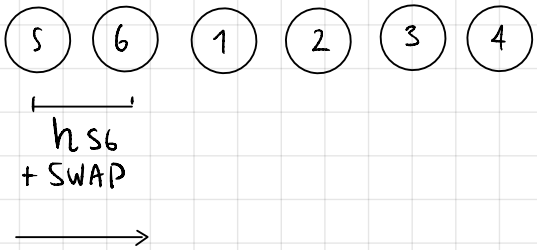


h_{23}, SWAP ✓
h_{24}, SWAP ✓
h_{25}, SWAP ✓
h_{26}, SWAP ✓
SWAP ✓ → EXTRA SWAP TO HAVE THE RIGHT ORDER AFTER (1)



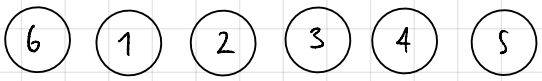
⋮

$j = N - 1 = 5$



h_{56}, SWAP ✓
SWAP
SWAP
SWAP
SWAP

} MAYBE THIS IS NOT NECESSARY. BUT, IT IS WORKING.



WE CAN ADD REVERSE OR 1 MORE SWAP BETWEN 6 AND 1.