

The runtime of my program will be linear. I used Weighted Quick Union with path compression to solve this problem. Thanks to it being weighted along with path compression, each query is close to constant, but the initialization process is always linear. Therefore, the runtime will be linear. However, while testing my doubling ratio, it comes out to around 1.5 due to the amortized cost being  $\log N$  because we only pay linear time once while setting up Union Find, and all other operations are somewhere between constant and  $\log$ .