

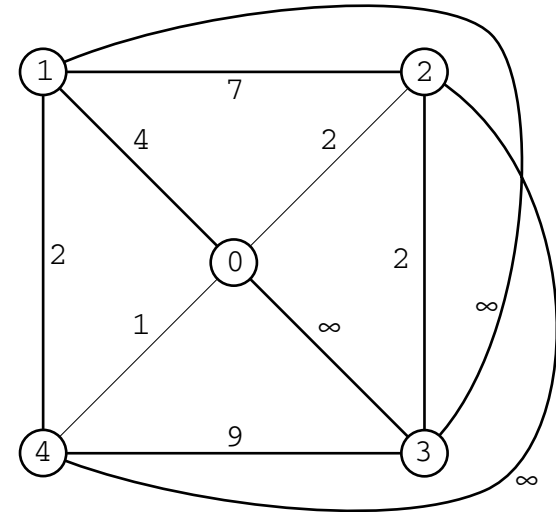
- 12) **10pts** There is a variant of Warshall's algorithm that can be used to find the length of the shortest path joining every pair of nodes in an undirected graph. To remind you how it works, it is described here in pseudocode.

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let n = number of nodes (= 5 in example)
Let A = the distance matrix
      (some of whose entries may be  $\infty$ )
for k = 0 to n-1
  for i = 0 to n-1
    for j = i+1 to n-1
      if (i  $\neq$  k and j  $\neq$  k) then
        let  $a_{ij} = \min\{ a_{ij}, a_{ik} + a_{kj} \}$ 
        let  $a_{ji} = a_{ij}$ 
      endif
    endfor
  endfor
endfor
output:

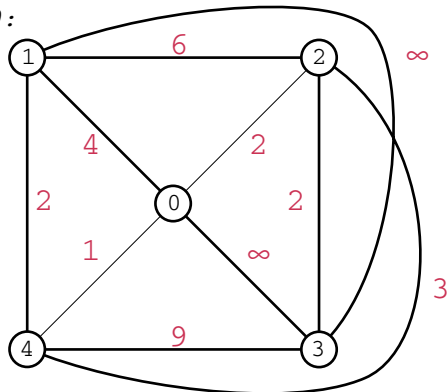
```

Note:  $\infty$  plus any number is  $\infty$

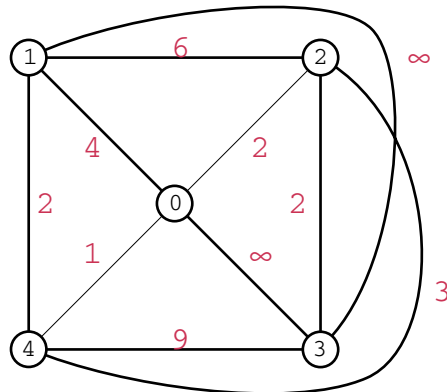


Show the results of each iteration by writing the values  $a_{ji} = a_{ij}$  on the arcs below:

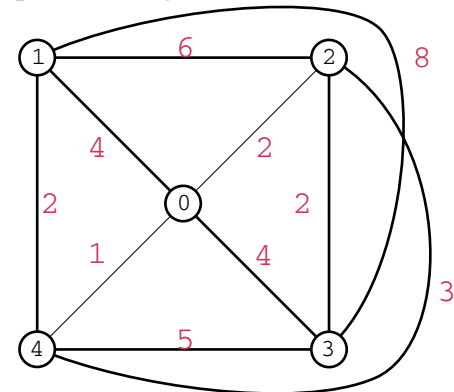
after processing k=0:



after processing k=1:

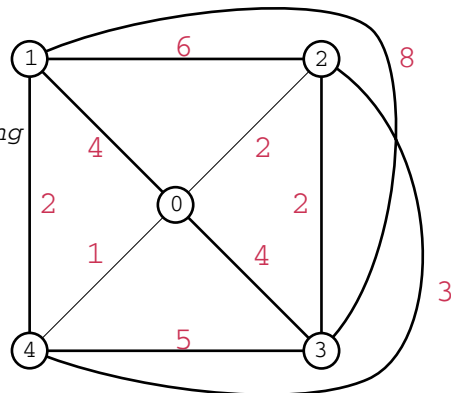


after processing k=2:



remark: a problem of this type was assigned as homework and also posted on the website. (Click on "warshall's algorithm", and then click on "discussion of 25 and 26".)

after processing k=3:



after processing k=4:

