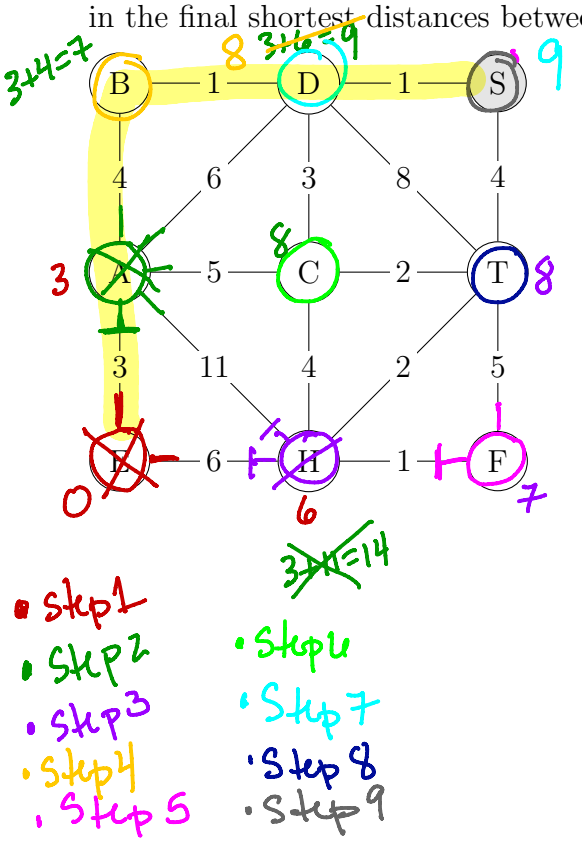
Worksheet 11 (Graph Theory 3): Dijkstra's Algorithm

1. Use Dijkstra's Algorithm to determine the shortest (weighted) distance between vertex S and vertex E.

   Keep track of the steps of the algorithm in the table to the right of the graph, and then fill in the final shortest distances between S and each other vertex below.



vertex	current/ visited	**tentative** minimum distance to E	preceding vertex	Vertices I will check!
A	~~C~~ V	3	E	B D C H
B	~~C~~ V	7	A	D
C	~~C~~ V	8	A	D T
D	~~C~~ V	~~9~~ 8	~~A~~ B	S T
E	~~C~~ V	0	—	~~A~~ ~~H~~
F	~~C~~ V	7	H	T
H	~~C~~ V	6 ~~11~~	E	C T F
S	C	9	D	
T	~~C~~ V	8	H	S

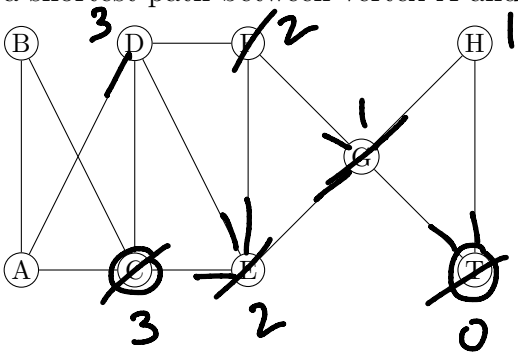
- step 1
- step 2
- step 3
- step 4
- step 5
- step 6
- step 7
- step 8
- step 9

Length of the shortest path from S to E: 9

Find the shortest path from S to E *using the last column in the table.*

S D B A E

2. We can also use Dijkstra's algorithm to find the shortest distance between two vertices in a graph that does not have weights on the edges, by assuming all of the weights are 1. Find a shortest path between vertex A and vertex T. As usual, break ties alphabetically.



vertex	current/ visited	**tentative** minimum distance to e	preceding vertex
A	C stop	4	C
B		4	C
C	C V	3	E
D	C V	3	E
E	C V	2	G
F	C V	2	G
G	C V	1	T
H	C V	1	T
T	C V	0	—

Length of the shortest path from A to T: 4

Find the shortest path from A to T *using the last column in the table.*

A C E G T