Aalto University
School of Science

Homework solution

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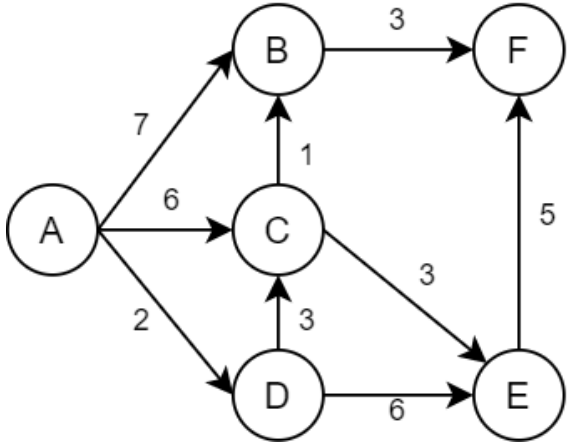
Homework: Dijkstra's shortest path algorithm

Given the following graph, where arcs connecting nodes A to F have different costs, find the shortest path from node A to node F by using Dijkstra's algorithm.

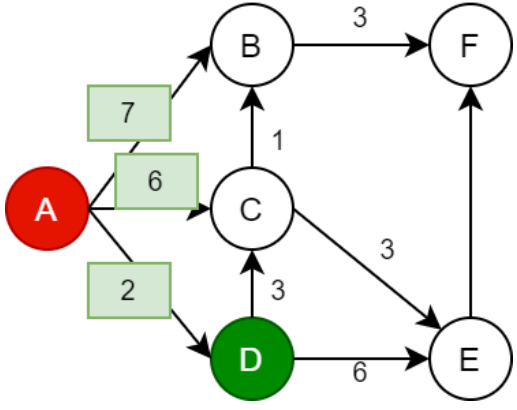
Report the labels d_i and the candidate list V in each iteration. What path is the shortest based on Dijkstra's algorithm?



Dijkstra's algorithm: Node removed from V is always the one with the minimum label

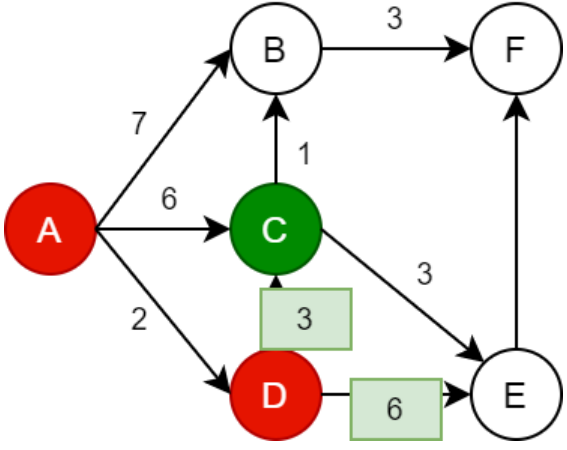
Iteration

V	d_A	d_B	d_C	d_D	d_E	d_F
{A}	0	∞	∞	∞	∞	∞
{B, C, **D**}	0	**7**	**6**	**2**	∞	∞



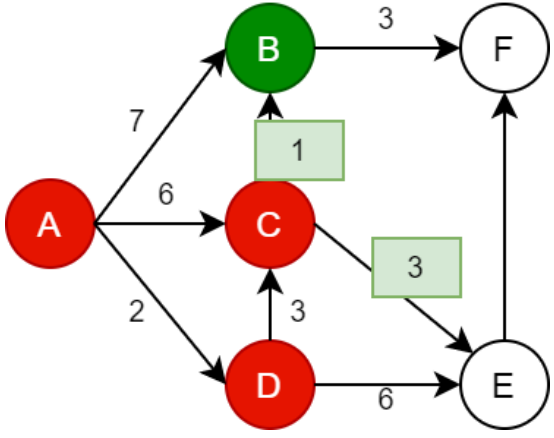
Iteration

V	d_A	d_B	d_C	d_D	d_E	d_F
{**A**}	0	∞	∞	∞	∞	∞
{B, C, **D**}	0	**7**	**6**	**2**	∞	∞
{B, **C**, E}	0	7	5	2	**8**	∞



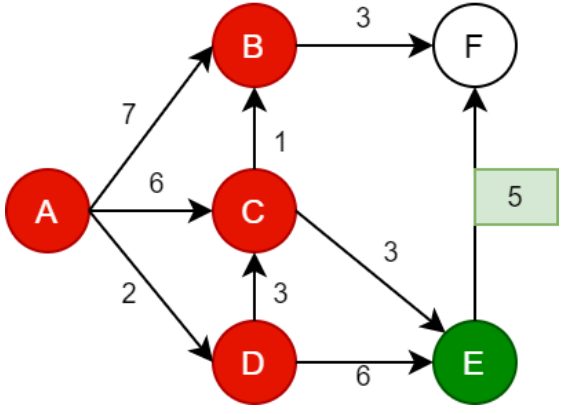
Iteration

V	d_A	d_B	d_C	d_D	d_E	d_F
{**A**}	0	∞	∞	∞	∞	∞
{B, C, **D**}	0	**7**	**6**	**2**	∞	∞
{B, **C**, E}	0	7	5	2	**8**	∞
{**B**, E}	0	**6**	5	2	8	∞



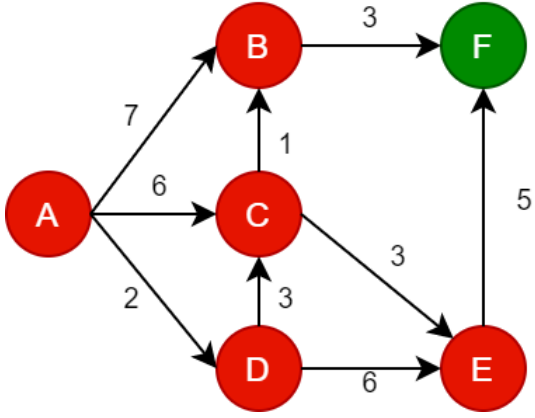
Iteration

V	d_A	d_B	d_C	d_D	d_E	d_F
{**A**}	0	∞	∞	∞	∞	∞
{B, C, **D**}	0	**7**	**6**	**2**	∞	∞
{B, **C**, E}	0	7	5	2	**8**	∞
{**B**, E}	0	**6**	5	2	8	∞
{**E**, F}	0	6	5	2	8	**9**



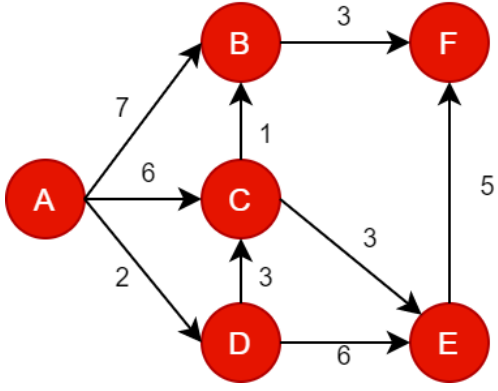
Iteration

V	d_A	d_B	d_C	d_D	d_E	d_F
{**A**}	0	∞	∞	∞	∞	∞
{B, C, **D**}	0	**7**	**6**	**2**	∞	∞
{B, **C**, E}	0	7	5	2	**8**	∞
{**B**, E}	0	**6**	5	2	8	∞
{**E**, F}	0	6	5	2	8	**9**
{**F**}	0	6	5	2	8	9



Iteration end

V	d_A	d_B	d_C	d_D	d_E	d_F
{**A**}	0	∞	∞	∞	∞	∞
{B, C, **D**}	0	**7**	**6**	**2**	∞	∞
{B, **C**, E}	0	7	5	2	**8**	∞
{**B**, E}	0	**6**	5	2	8	∞
{**E**, F}	0	6	5	2	8	**9**
{**F**}	0	6	5	2	8	9
{}	0	6	5	2	8	9



Trace back to get shortest path

V	d_A	d_B	d_C	d_D	d_E	d_F
{**A**}	0	∞	∞	∞	∞	∞
{B, C, **D**}	0	**7**	**6**	**2**	∞	∞
{B, **C**, E}	0	7	5	2	**8**	∞
{**B**, E}	0	**6**	5	2	8	∞
{**E**, F}	0	6	5	2	8	**9**
{**F**}	0	6	5	2	8	9
{}	0	6	5	2	8	9