

## Shortest Paths

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3/3 points earned  
(100%)

Quiz passed!



1 / 1  
points

1.

```

1 (seed = 489125)
2 Consider the following edge-weighted digraph with 8 vertices
3 and 13 edges.
4
5 v->w weight
6 -----
7 A->E 23
8 A->F 2
9 B->A 10
10 B->F 9
11 C->B 56
12 D->C 24
13 D->G 47
14 D->H 6
15 F->E 28
16 G->B 37
17 G->C 1
18 G->F 51
19 H->G 34
20
21
22 Here is a graphical representation of the same edge-weighted digraph:
23
24 (A)-----10-----<(B)-----56-----<(C)-----24-----<(D)
25 | \
26 |  \
27 |   \
28 |    \
29 |     \
30 |      \
31 |       \
32 |        \
33 |         \
34 |          \
35 |           \
36 |            \
37 |             \
38 |              \
39 |               \
40 (E)-----28-----<(F)-----51-----<(G)-----34-----<(H)
41
42 Here is the distTo[] array before D is relaxed:
43
44      v    A    B    C    D    E    F    G    H
45 -----
46 distTo[v]  -    -    -    0    -    -    -    -

```

Suppose that you run Dijkstra's algorithm to compute the shortest paths from D to every other vertex. Give the sequence of 8 integers in the distTo[] array immediately after vertex F is relaxed.

87 77 24 0 114 86 40 6

Correct Response

```

1 The correct answer is: 87 77 24 0 114 86 40 6
2
3
4 Here is the initial distTo[] array:
5
6       v    A    B    C    D    E    F    G    H
7 -----
8 distTo[v]  -    -    -    0    -    -    -    -
9
10
11 Here is the distTo[] array after vertex D is relaxed:
12 [ edge relaxations that change the distTo[] array: D->H D->G D->C
13   ]
14
15       v    A    B    C    D    E    F    G    H
16 -----
17 distTo[v]  -    -    24    0    -    -    47    6
18
19 Here is the distTo[] array after vertex H is relaxed:
20 [ edge relaxations that change the distTo[] array: H->G ]
21
22       v    A    B    C    D    E    F    G    H
23 -----
24 distTo[v]  -    -    24    0    -    -    40    6
25
26
27 Here is the distTo[] array after vertex C is relaxed:
28 [ edge relaxations that change the distTo[] array: C->B ]
29
30       v    A    B    C    D    E    F    G    H
31 -----
32 distTo[v]  -    80    24    0    -    -    40    6
33
34
35 Here is the distTo[] array after vertex G is relaxed:
36 [ edge relaxations that change the distTo[] array: G->B G->F ]
37
38       v    A    B    C    D    E    F    G    H
39 -----
40 distTo[v]  -    77    24    0    -    91    40    6
41
42
43 Here is the distTo[] array after vertex B is relaxed:
44 [ edge relaxations that change the distTo[] array: B->F B->A ]
45
46       v    A    B    C    D    E    F    G    H
47 -----
48 distTo[v]  87    77    24    0    -    86    40    6
49
50
51 Here is the distTo[] array after vertex F is relaxed:
52 [ edge relaxations that change the distTo[] array: F->E ]
53
54       v    A    B    C    D    E    F    G    H
55 -----
56 distTo[v]  87    77    24    0 114    86    40    6

```



1 / 1  
points

2.

```

1 (seed = 50548)
2 Consider the following edge-weighted DAG with 8 vertices and 13
3 edges.
4
5 v->w weight
6 -----
7 A->B 39
8 A->E 114
9 A->F 84
10 B->C 92
11 B->F 39
12 B->G 70
13 C->D 5
14 C->H 5
15 F->E 30
16 F->G 21
17 G->C 30
18 G->H 27
19 H->D 0
20
21
22 Here is a graphical representation of the same edge-weighted digraph:
23
24 (A)-----39----->(B)-----92----->(C)-----5----->(D)
25 | \
26 |  \
27 |   \
28 |    \
29 |     \
30 |      \
31 |       \
32 |        \
33 |         \
34 |          \
35 |           \
36 |            \
37 |             \
38 |              \
39 |               \
40 (E)-----30----->(F)-----21----->(G)-----27----->(H)
41
42 Here is the distTo[] array before A is relaxed:
43
44      v    A    B    C    D    E    F    G    H
45 -----
46 distTo[v]  0    -    -    -    -    -    -    -    -

```

Suppose that you run the acyclic shortest paths algorithm to compute the shortest paths from A to every other vertex using the following topological order:

A B F G C H D E

Give the sequence of 8 integers in the distTo[] array immediately after vertex C is relaxed.

0 39 129 134 108 78 99 126



Correct Response

```

1 The correct answer is: 0 39 129 134 108 78 99 126
2
3
4 Here is the initial distTo[] array:
5
6       v    A    B    C    D    E    F    G    H
7 -----
8 distTo[v]  0    -    -    -    -    -    -    -    -
9
10
11 Here is the distTo[] array after vertex A is relaxed:
12 [ edge relaxations that change the distTo[] array: A->E A->B A->F
13   ]
14
15       v    A    B    C    D    E    F    G    H
16 -----
17 distTo[v]  0  39    -    - 114  84    -    -
18
19 Here is the distTo[] array after vertex B is relaxed:
20 [ edge relaxations that change the distTo[] array: B->F B->C B->G
21   ]
22
23       v    A    B    C    D    E    F    G    H
24 -----
25 distTo[v]  0  39 131    - 114  78 109    -
26
27 Here is the distTo[] array after vertex F is relaxed:
28 [ edge relaxations that change the distTo[] array: F->G F->E ]
29
30       v    A    B    C    D    E    F    G    H
31 -----
32 distTo[v]  0  39 131    - 108  78 99    -
33
34
35 Here is the distTo[] array after vertex G is relaxed:
36 [ edge relaxations that change the distTo[] array: G->C G->H ]
37
38       v    A    B    C    D    E    F    G    H
39 -----
40 distTo[v]  0  39 129    - 108  78 99 126
41
42
43 Here is the distTo[] array after vertex C is relaxed:
44 [ edge relaxations that change the distTo[] array: C->D ]
45
46       v    A    B    C    D    E    F    G    H
47 -----
48 distTo[v]  0  39 129 134 108  78 99 126 |

```



1 / 1  
points

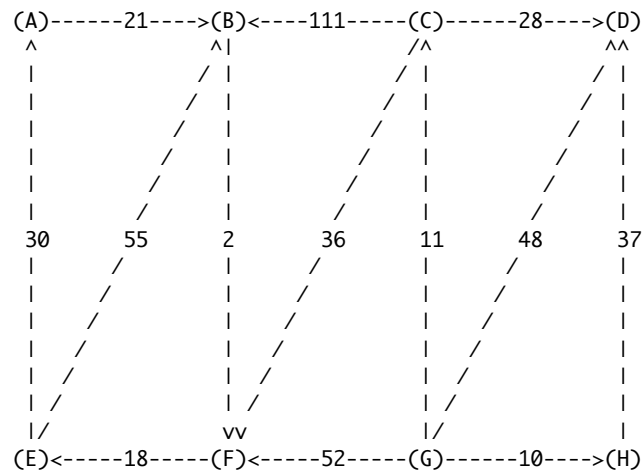
3.

```

1 (seed = 699940)
2 Consider the following edge-weighted digraph with 8 vertices
3 and 13 edges.
4
5 v->w weight
6 -----
7 A->B 21
8 B->F 2
9 C->F 36
10 C->D 28
11 C->B 111
12 E->A 30
13 E->B 55
14 F->E 18
15 G->H 10
16 G->F 52
17 G->D 48
18 G->C 11
19 H->D 37
20
21

```

Here is a graphical representation of the same edge-weighted digraph:



Here is the distTo[] array before the beginning of pass 0:

v	A	B	C	D	E	F	G	H
distTo[v]	-	-	-	-	-	-	0	-

Suppose that you run the Bellman-Ford algorithm to compute the shortest paths from G to every other vertex. Give the sequence of 8 integers in the distTo[] array immediately after the end of three passes of the algorithm (pass 0, 1, and 2). Each pass consists of relaxing the 13 edges in the order given above.

95 120 11 39 65 47 0 10



Correct Response