Dijkstra's Shortest Path Algorithm
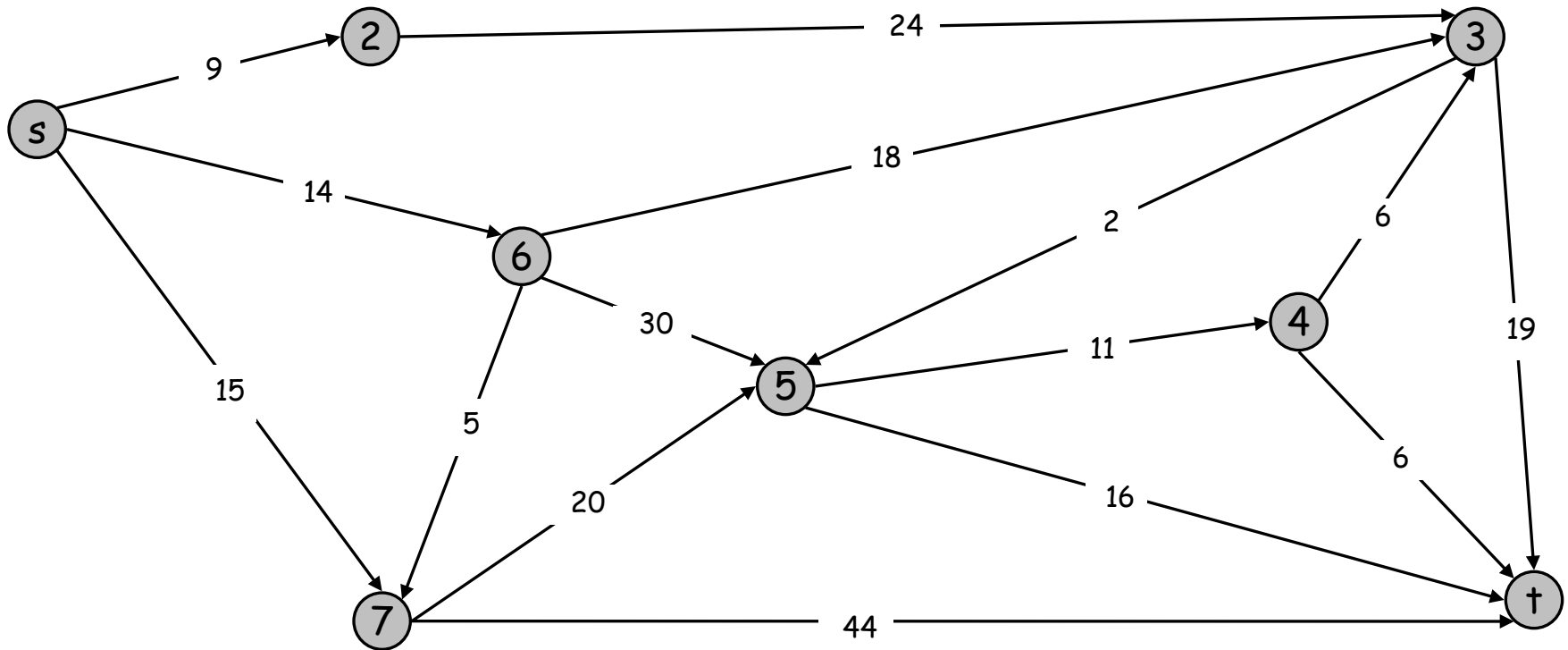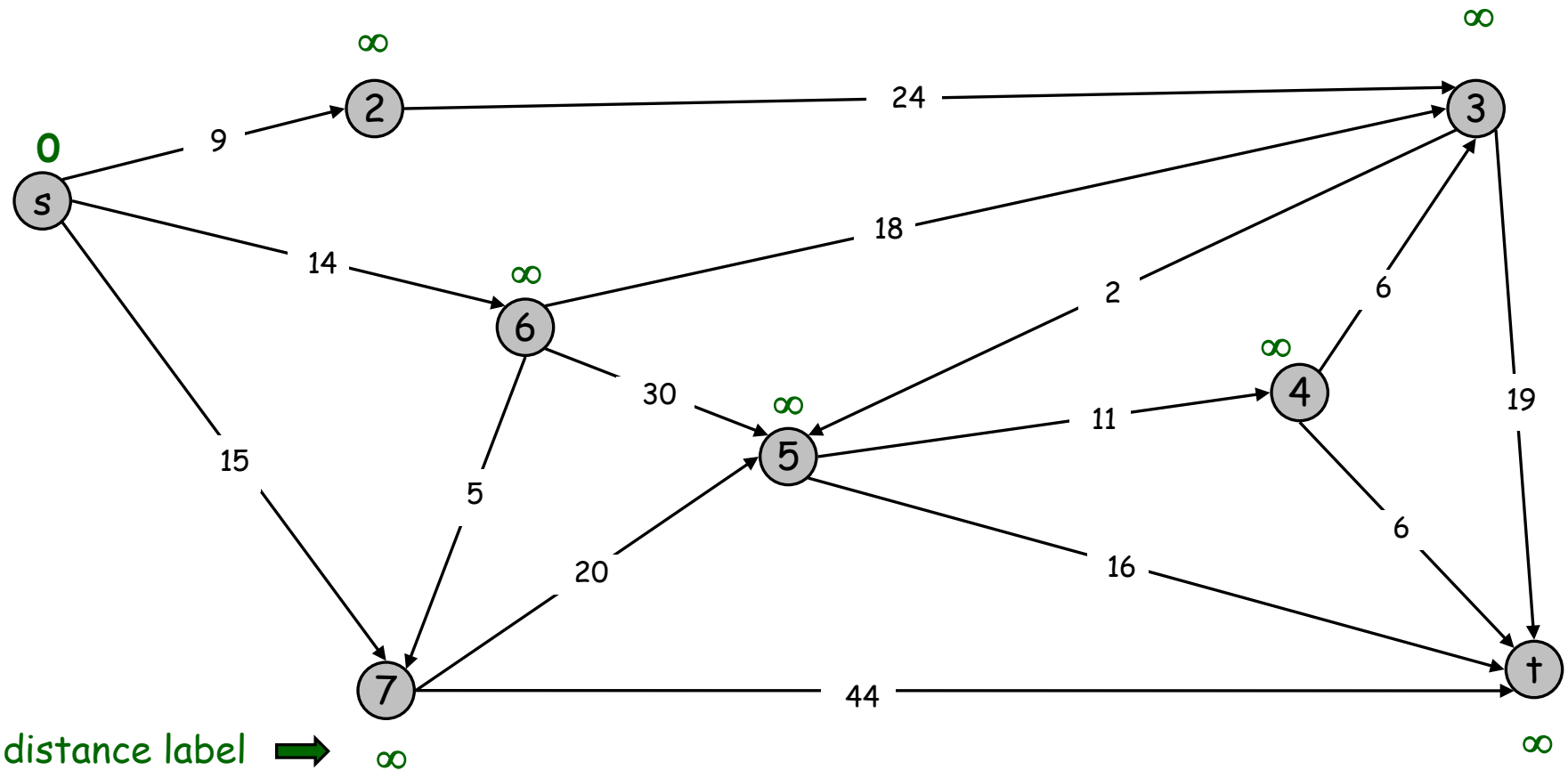
Find shortest path from s to t.

Dijkstra's Shortest Path Algorithm

S = { }
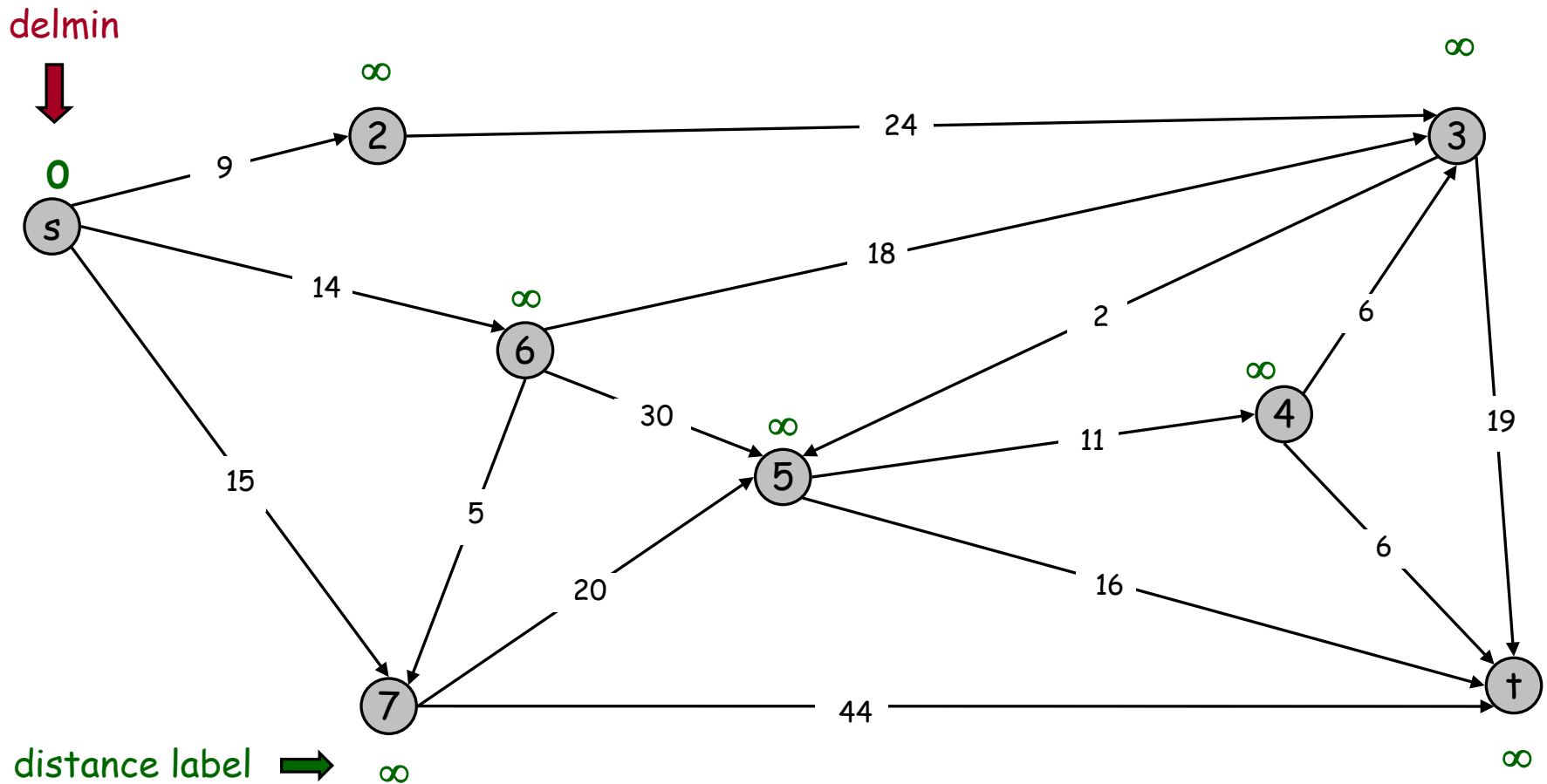PQ = { s, 2, 3, 4, 5, 6, 7, t }

distance label ⟹

Dijkstra's Shortest Path Algorithm

S = { }
PQ = { s, 2, 3, 4, 5, 6, 7, t }

delmin

distance label ➡

3

Dijkstra's Shortest Path Algorithm

S = { s }
PQ = { 2, 3, 4, 5, 6, 7, † }

decrease key

∞

✗ **9**
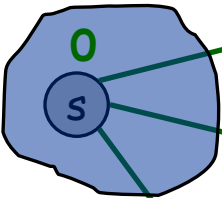
24

3

0

9

2

s

18

14

∞

✗ **14**

2

6

6

30

∞

∞

4

19

5

11

15

5

6

20

16

7

44

†

distance label ➡ ✗ **15**

∞

4

Dijkstra's Shortest Path Algorithm

S = { s }
PQ = { 2, 3, 4, 5, 6, 7, † }

distance label
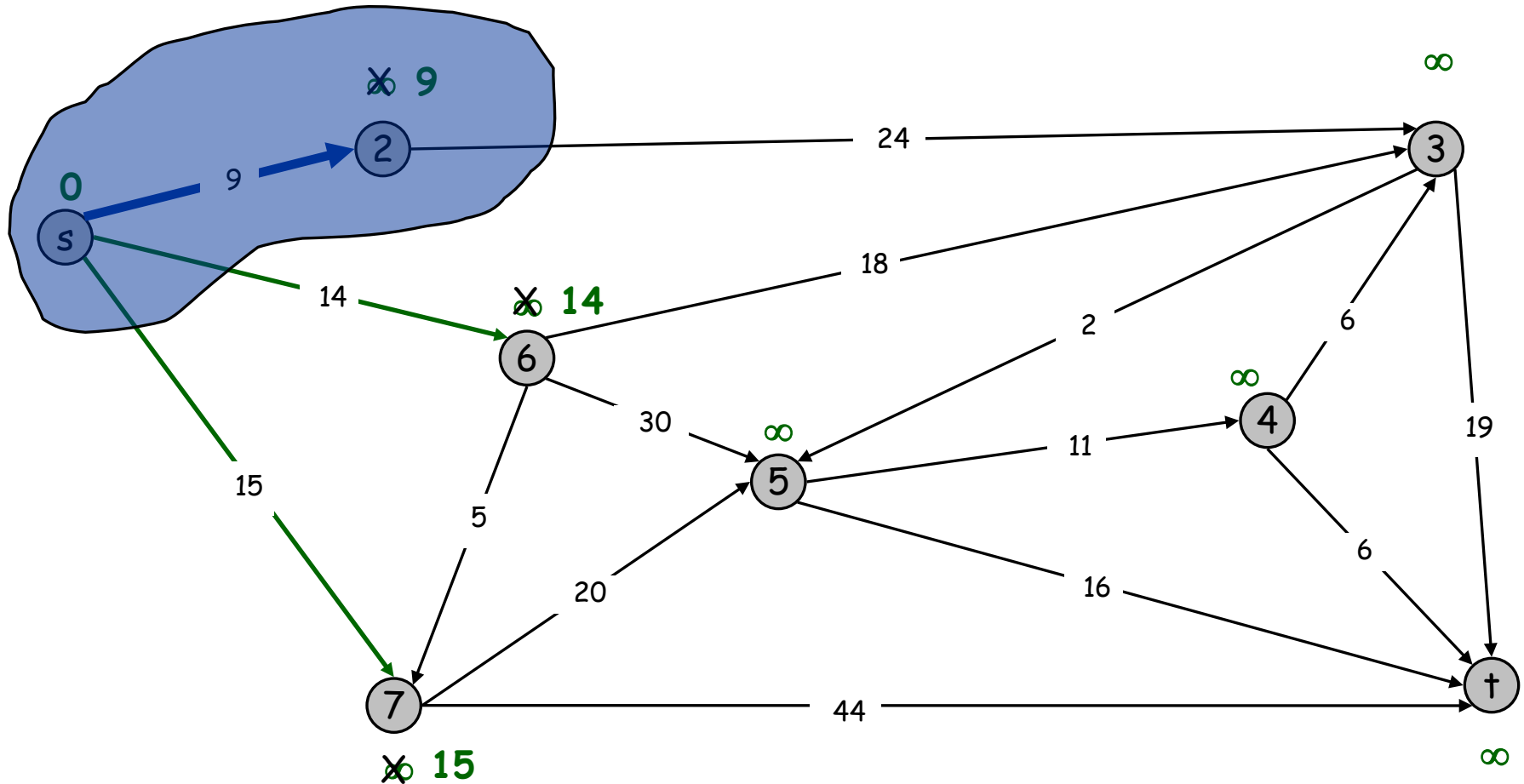
Dijkstra's Shortest Path Algorithm

S = { s, 2 }
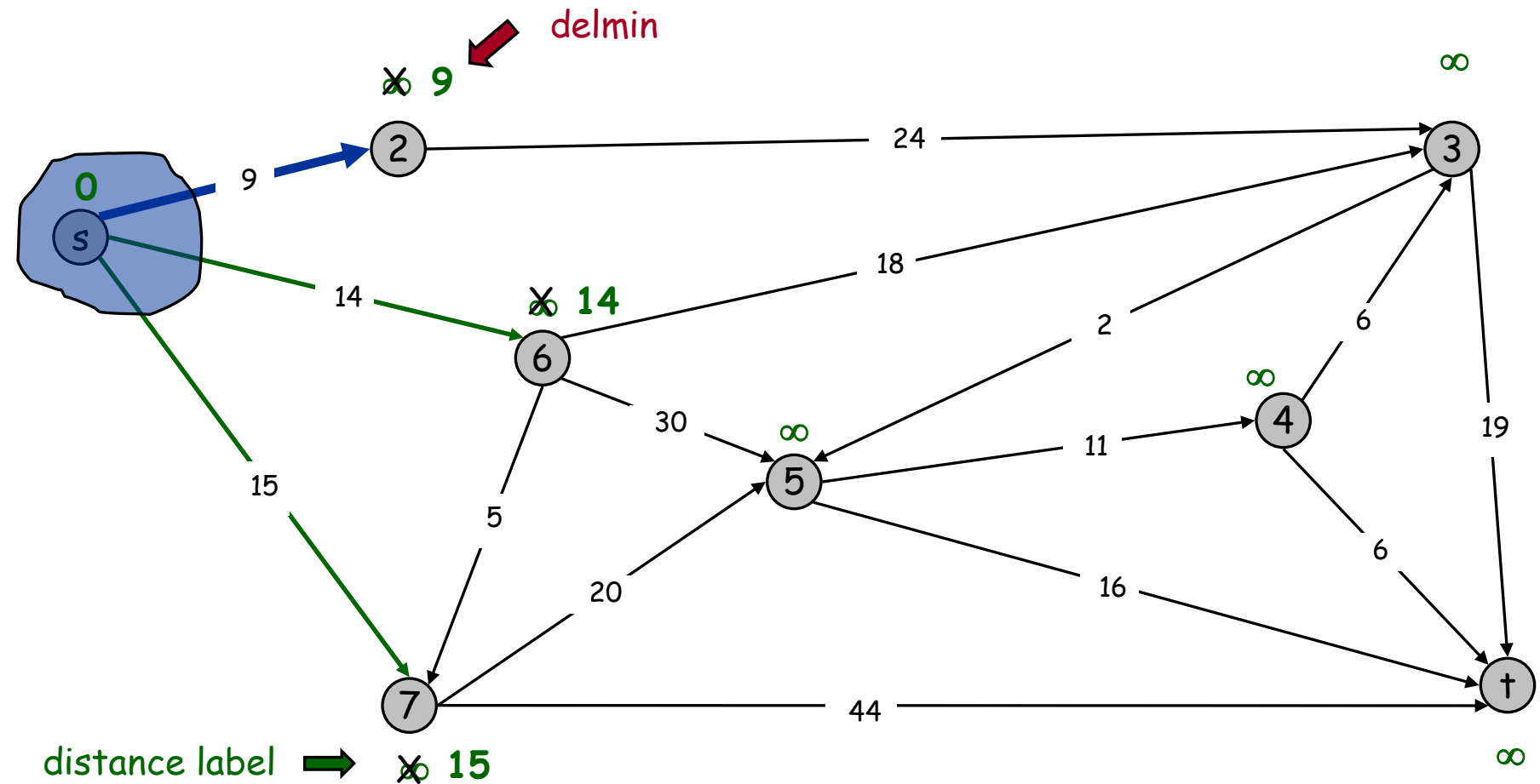PQ = { 3, 4, 5, 6, 7, † }

Dijkstra's Shortest Path Algorithm

S = { s, 2 }
PQ = { 3, 4, 5, 6, 7, t }

decrease key

∞ 33

∞ 9

2

0

s

24

9

3

18

14

∞ 14

6

2

6

30

∞

4

11

∞

5

5

15

20

6

16

19

7

44

t

∞ 15

∞

Dijkstra's Shortest Path Algorithm

S = { s, 2 }
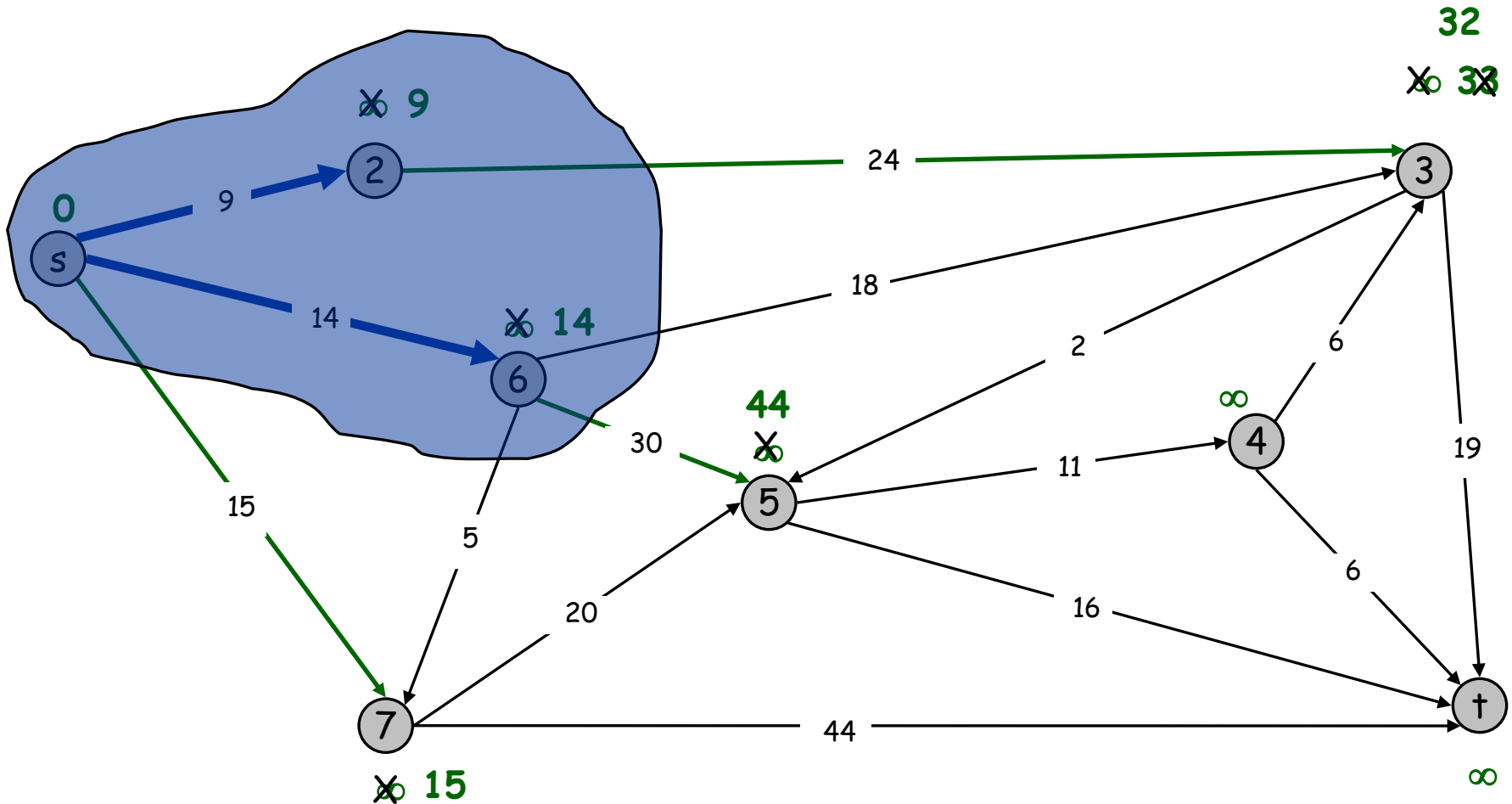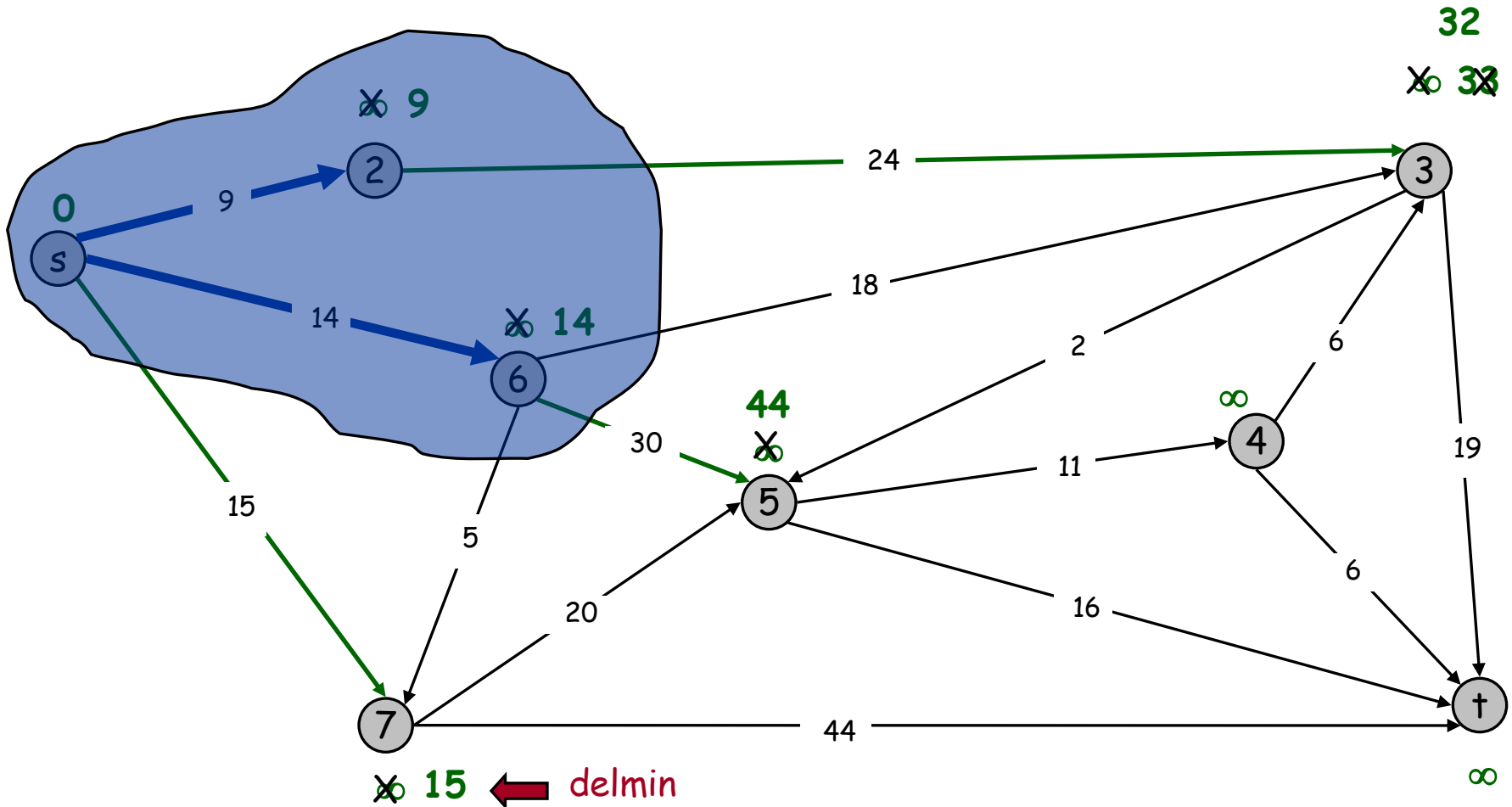PQ = { 3, 4, 5, 6, 7, † }
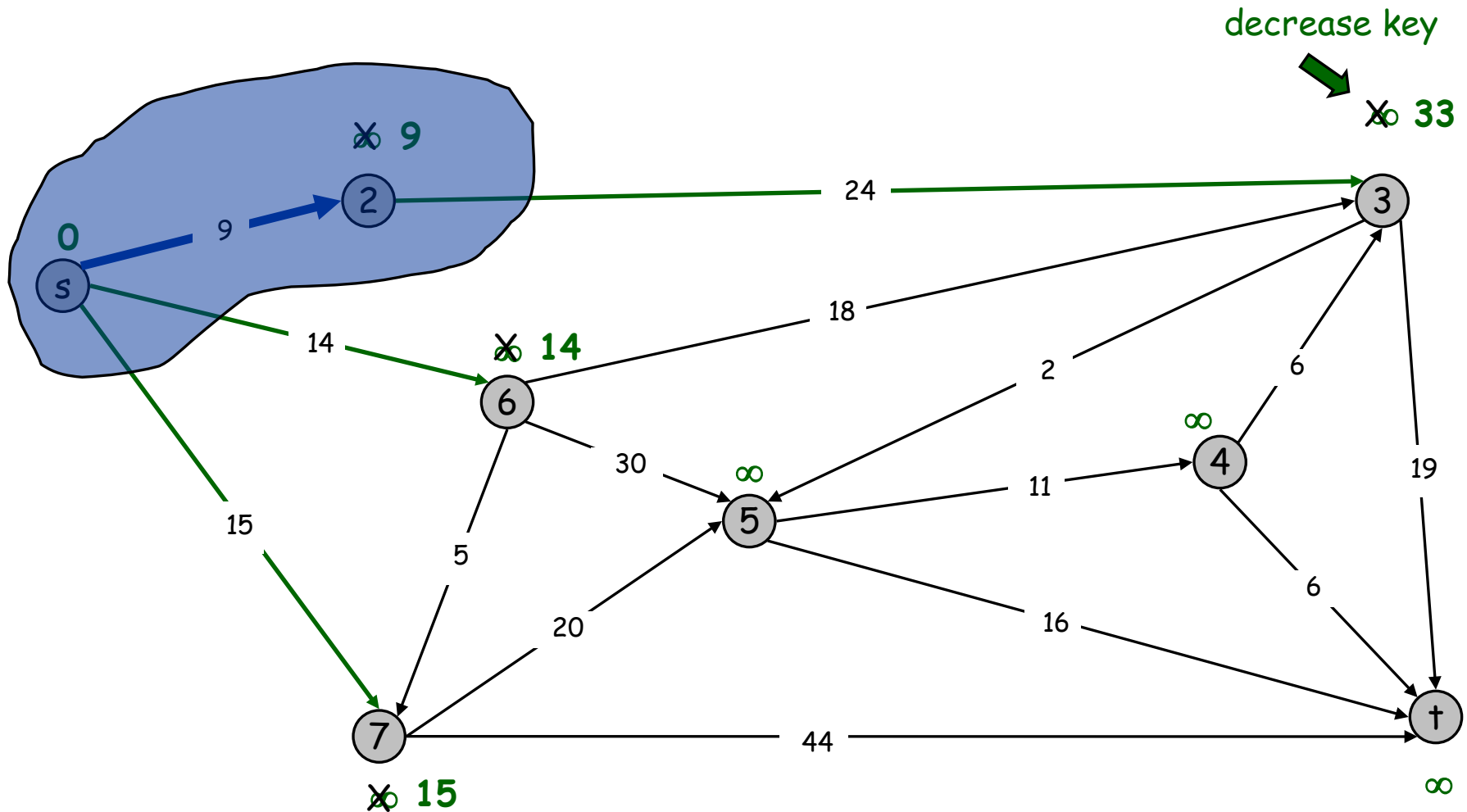
Dijkstra's Shortest Path Algorithm
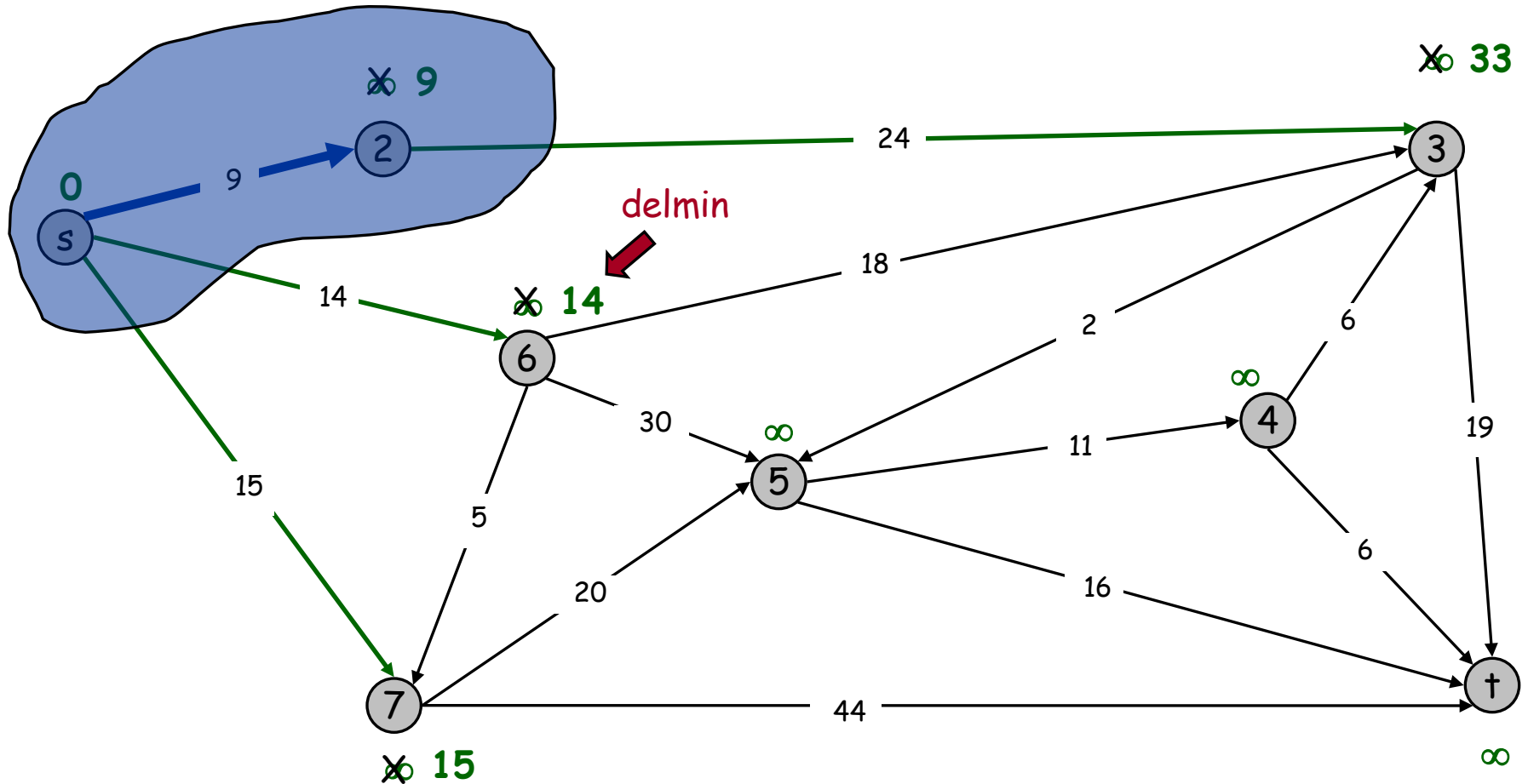
S = { s, 2, 6 }
PQ = { 3, 4, 5, 7, t }

Dijkstra's Shortest Path Algorithm

S = { s, 2, 6 }
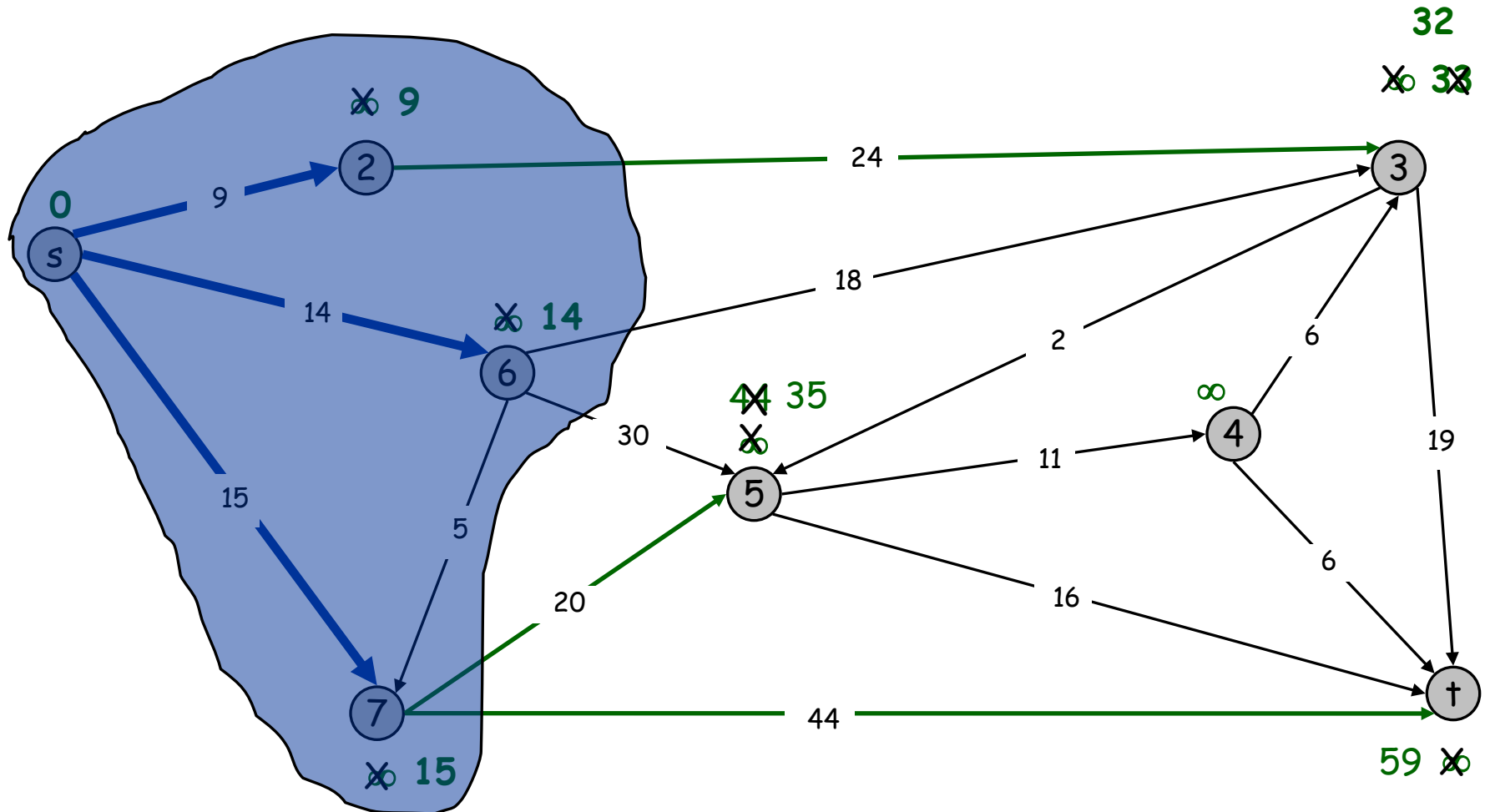PQ = { 3, 4, 5, 7, † }

Dijkstra's Shortest Path Algorithm

S = { s, 2, 6, 7 }
PQ = { 3, 4, 5, t }
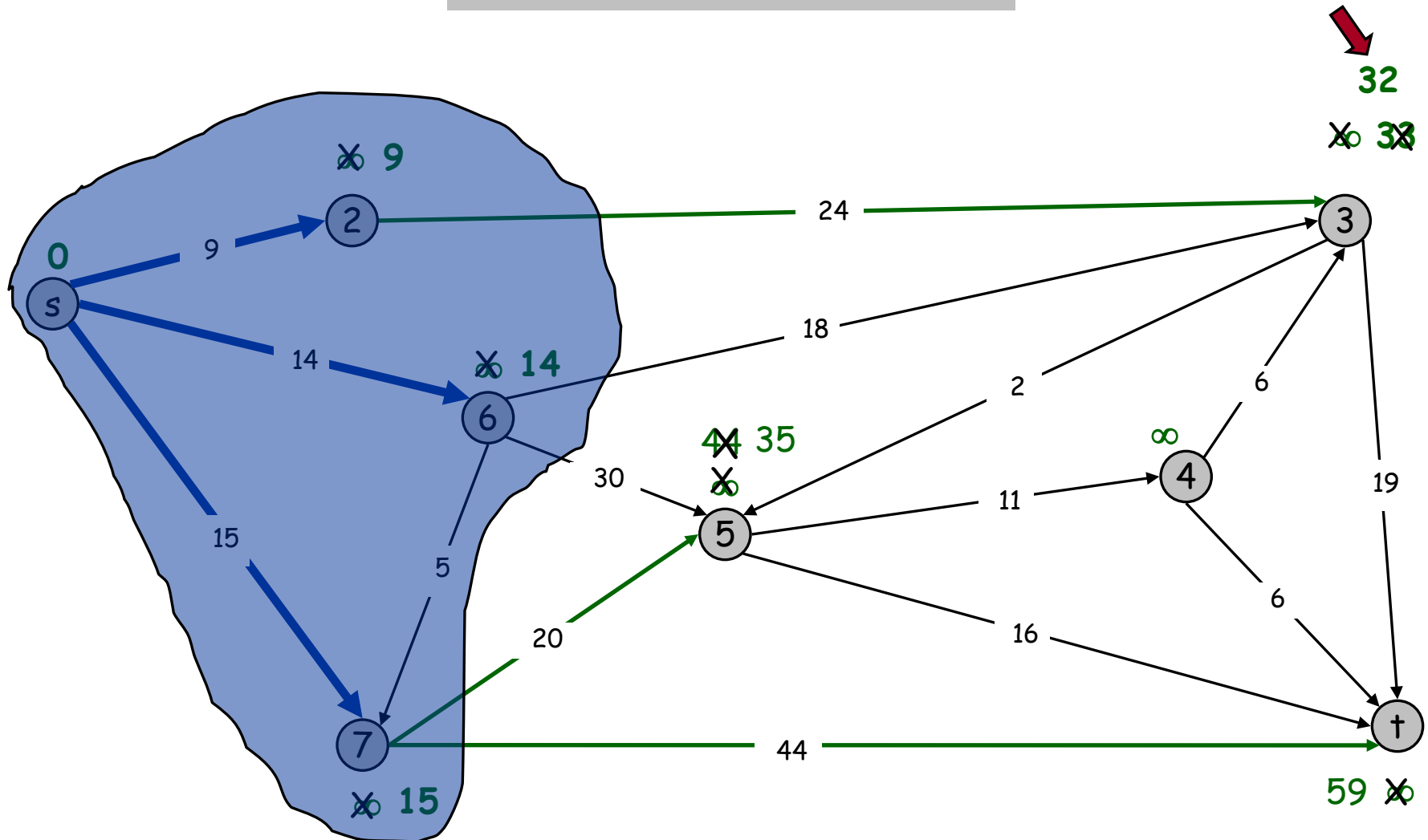

32
∞ 33

∞ 9

0

9

2

24

3

14

18

14

6

2

6

∞
4

44 35
∞

30

11

19

5

15

5

6

20

16

7

44

t

15

59

11

Dijkstra's Shortest Path Algorithm

S = { s, 2, 6, 7 }
PQ = { 3, 4, 5, t }

delmin

32

X̶o̶ 3̶3̶ 3̶8̶

X̶ 9 **9**

2

0

s

9

14

X̶ 1̶4̶ **14**

6

24

18

3

2

6

4̶4̶ 35

X̶
∞

∞

4

30

11

5

6

15

5

19

20

7

16

6

X̶ 1̶5̶ **15**

44

t

59 X̶o̶

Dijkstra's Shortest Path Algorithm

S = { s, 2, 3, 6, 7 }
PQ = { 4, 5, t }

Dijkstra's Shortest Path Algorithm

S = { s, 2, 3, 6, 7 }
PQ = { 4, 5, t }
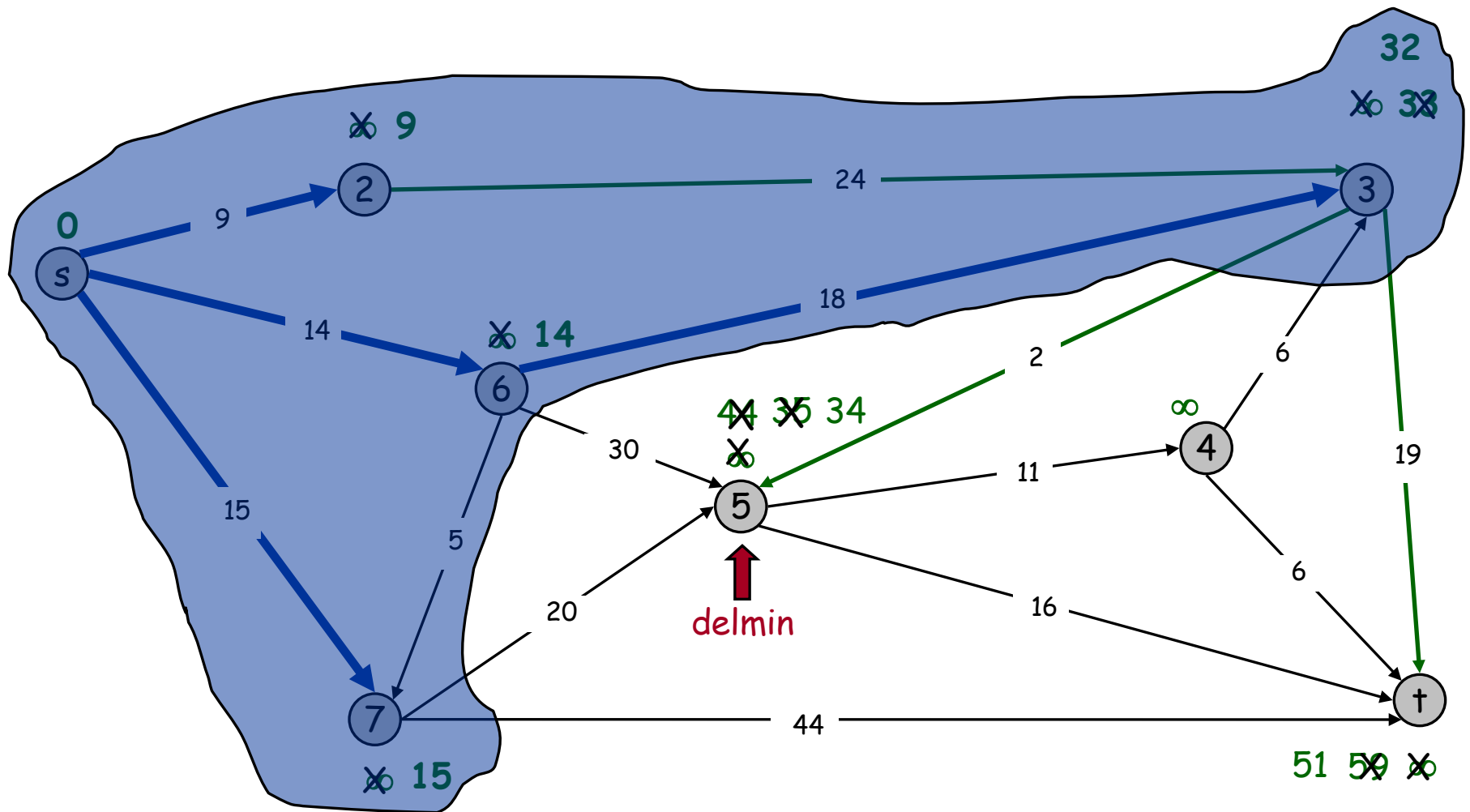

32

X̶0̶ 3̶3̶ 32

X̶0̶ 9

24

3

0

9

2

s

18

14

X̶0̶ 14

6

2

∞

4̶4̶ 3̶5̶ 34

X̶0̶

4

30

11

15

5

6

19

5

∞

delmin

16

6

20

7

44

t

X̶0̶ 15

51 5̶9̶ X̶0̶

14

Dijkstra's Shortest Path Algorithm

S = { s, 2, 3, 5, 6, 7 }
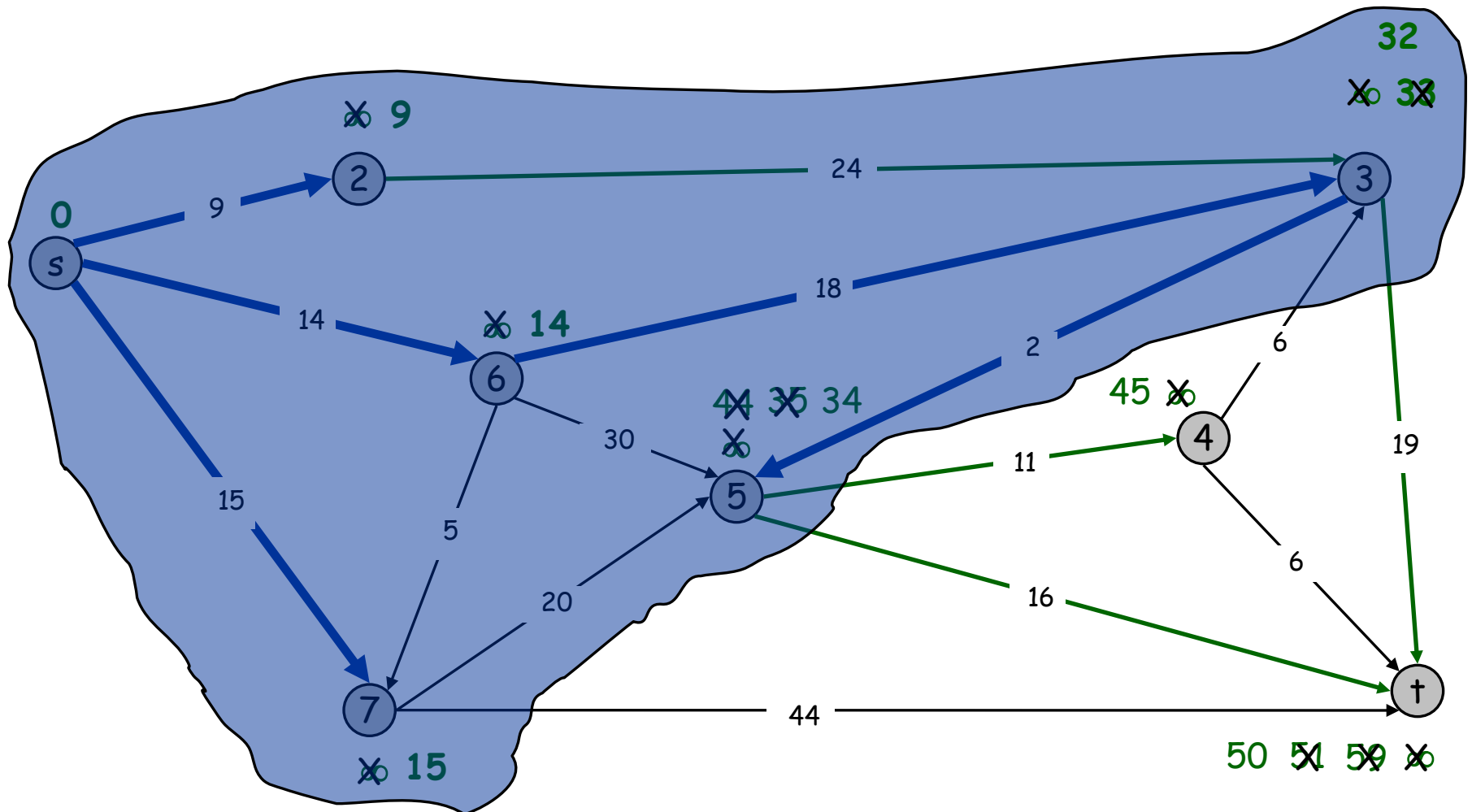PQ = { 4, t }

Dijkstra's Shortest Path Algorithm

S = { s, 2, 3, 5, 6, 7 }
PQ = { 4, t }
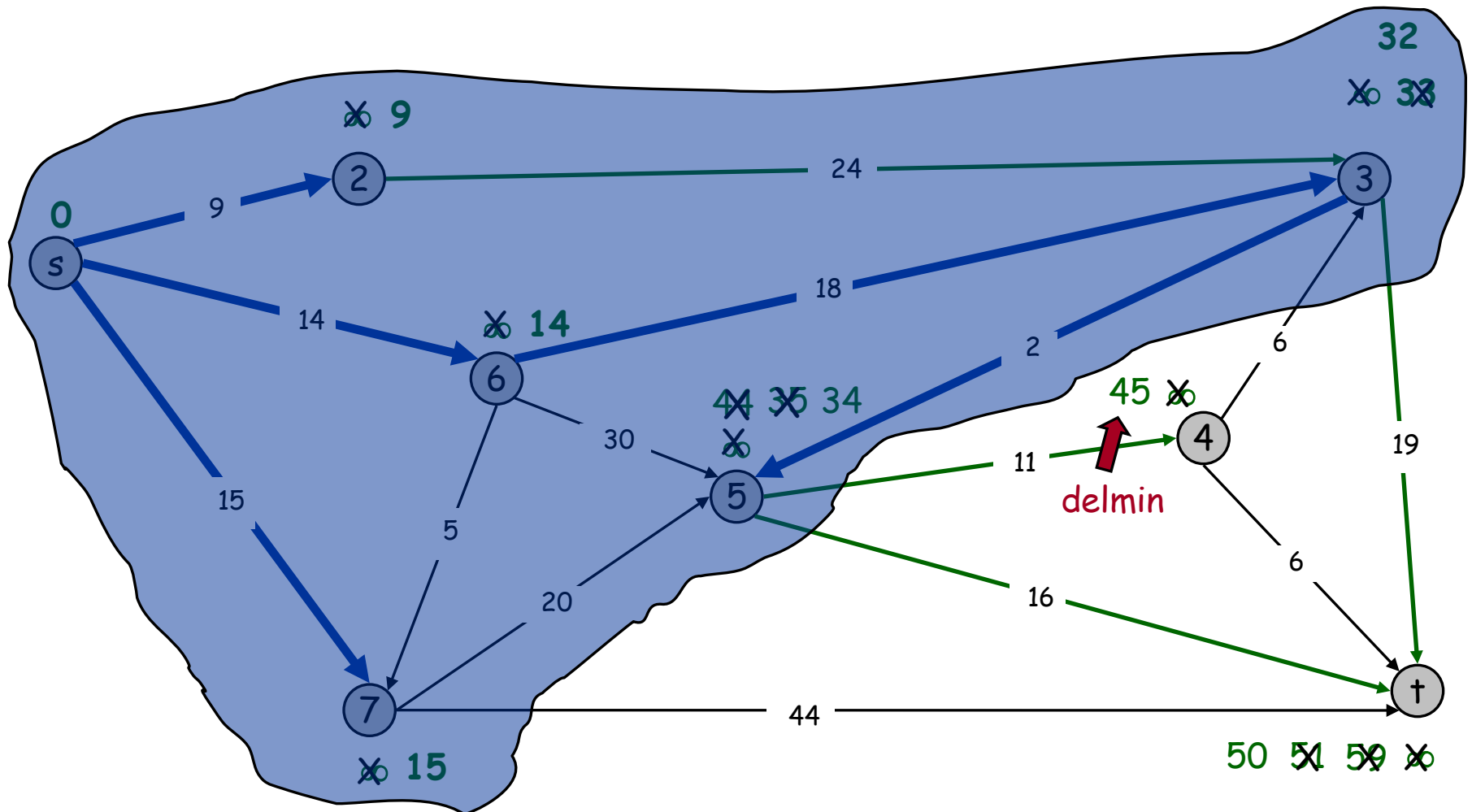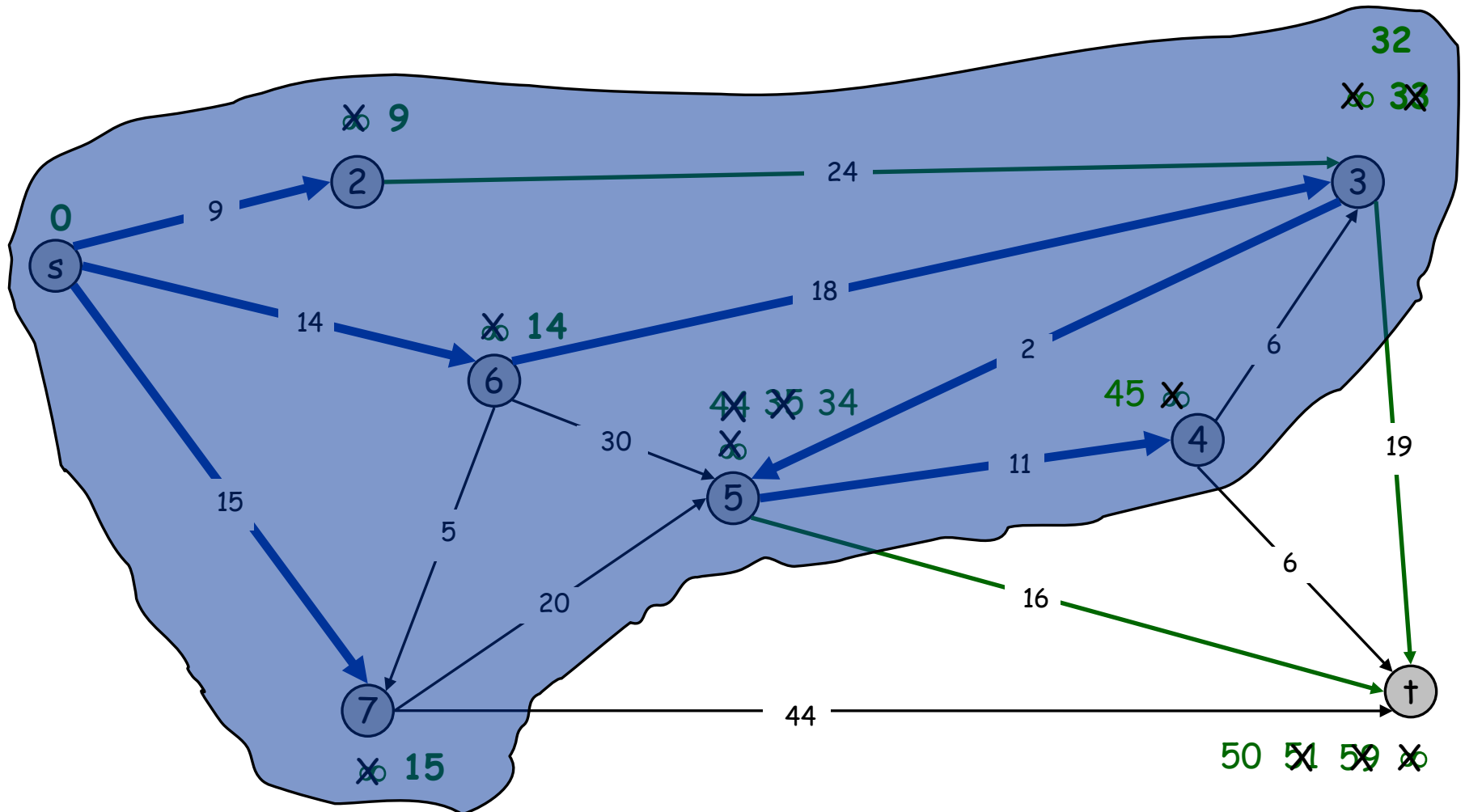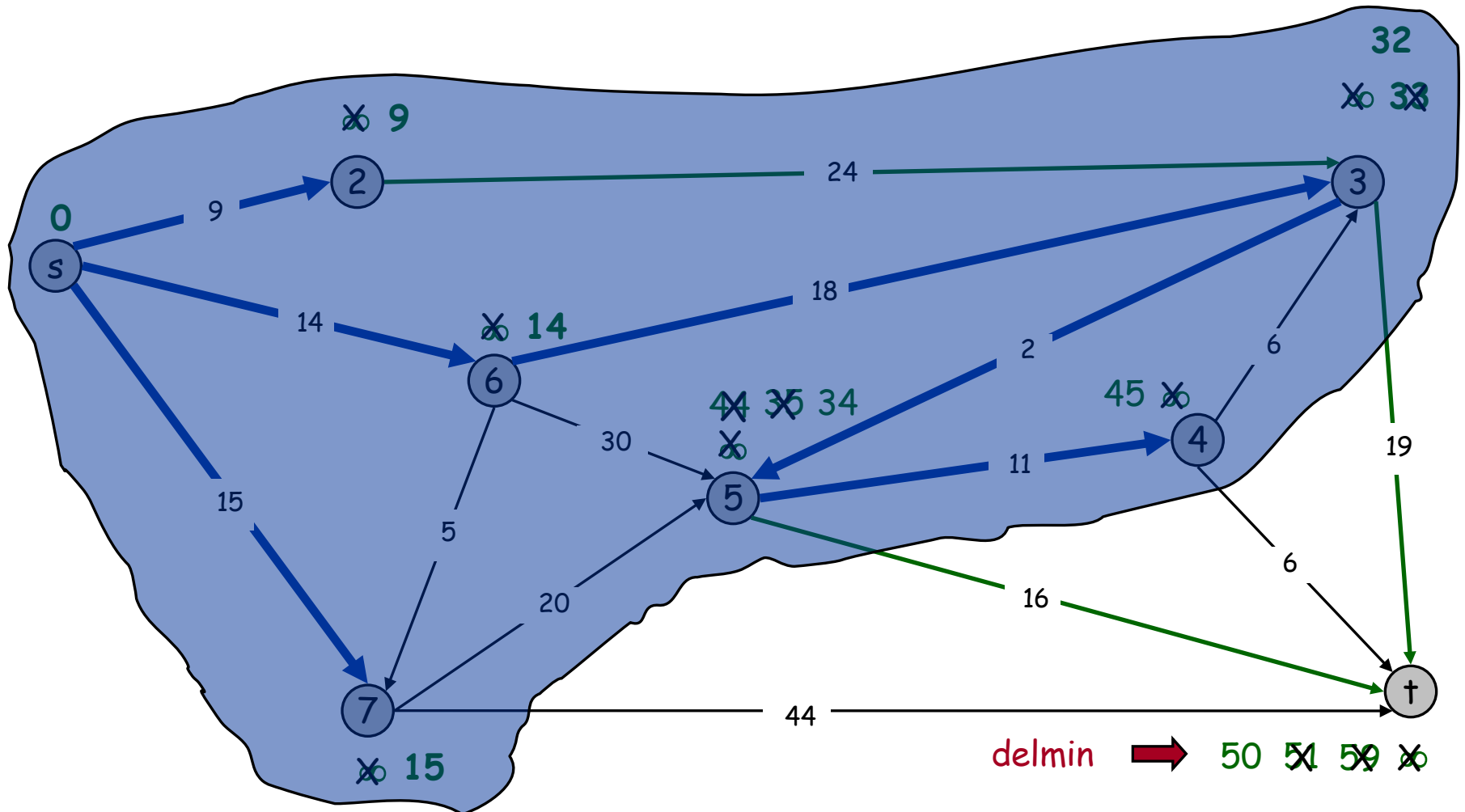
Dijkstra's Shortest Path Algorithm

S = { s, 2, 3, 4, 5, 6, 7 }
PQ = { t }

Dijkstra's Shortest Path Algorithm

S = { s, 2, 3, 4, 5, 6, 7 }
PQ = { t }

Dijkstra's Shortest Path Algorithm

S = { s, 2, 3, 4, 5, 6, 7, t }
PQ = { }