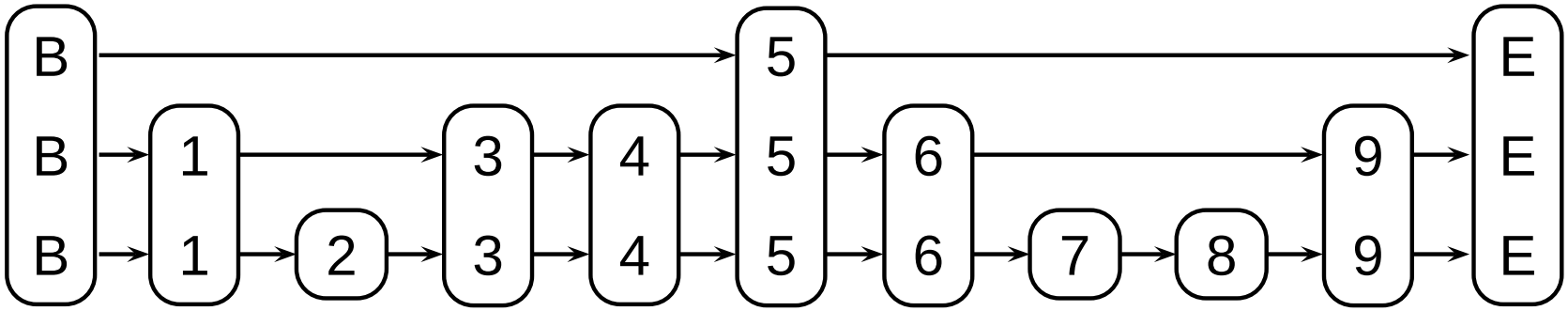
Listy z przeskokami jako drzewa wyszukiwań

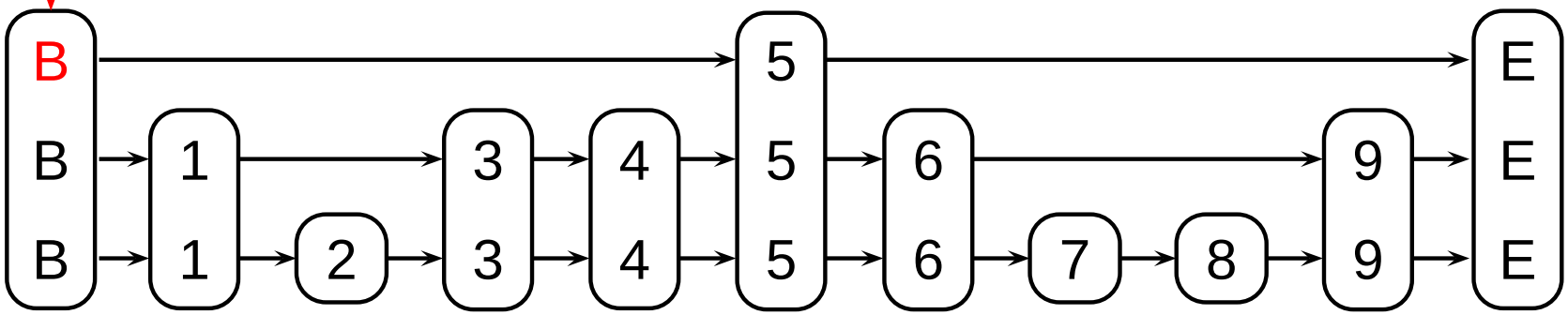
Dariusz Leniowski

16.10.2008

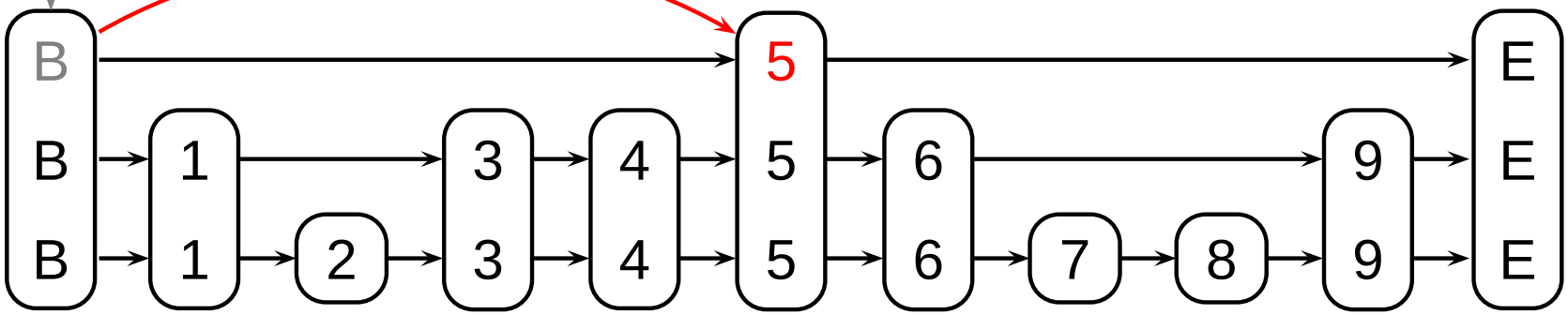
Lista z przeskokami.

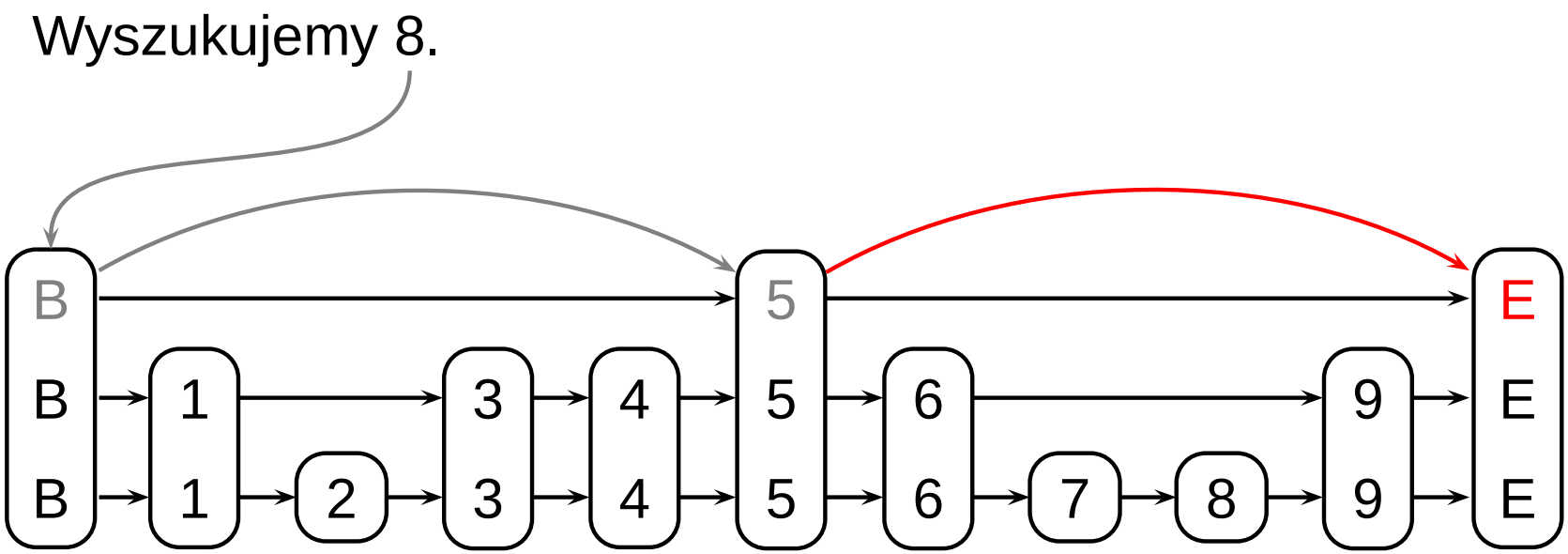


Wyszukujemy 8.

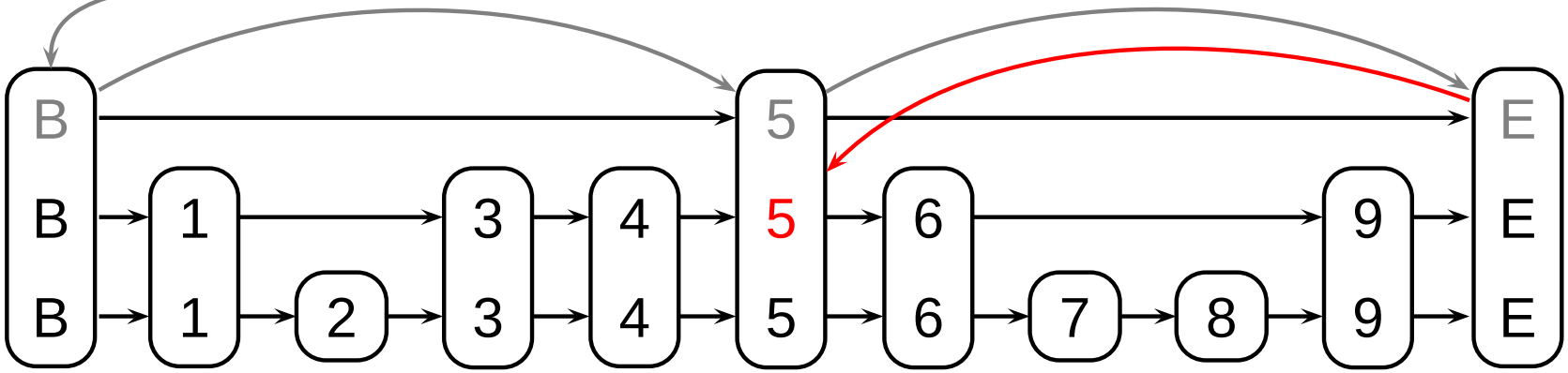


Wyszukujemy 8.

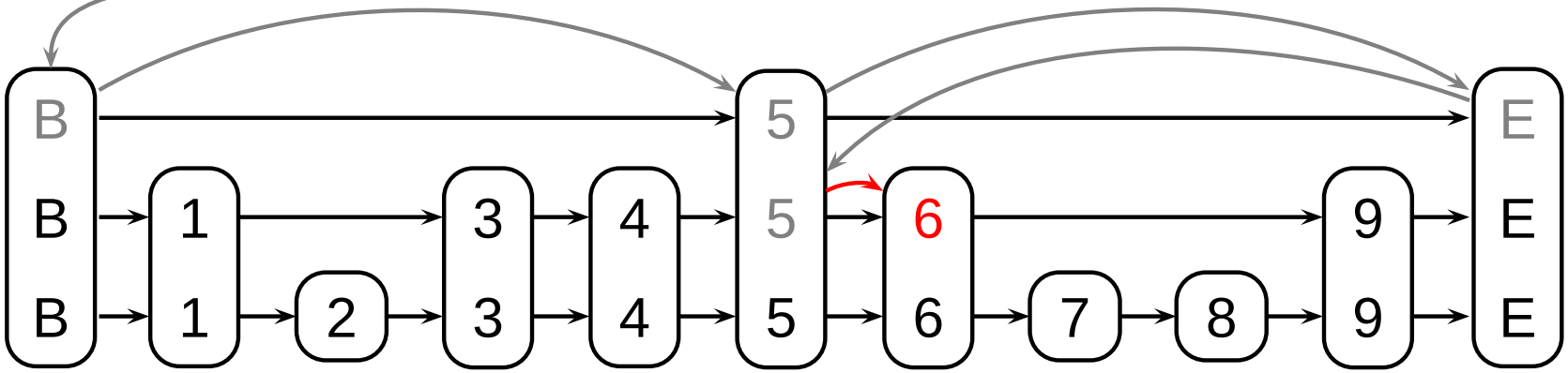



Wyszukujemy 8.
B
B
B
1
1
2
3
3
4
4
5
5
5
6
6
7
8
9
9
E
E
E

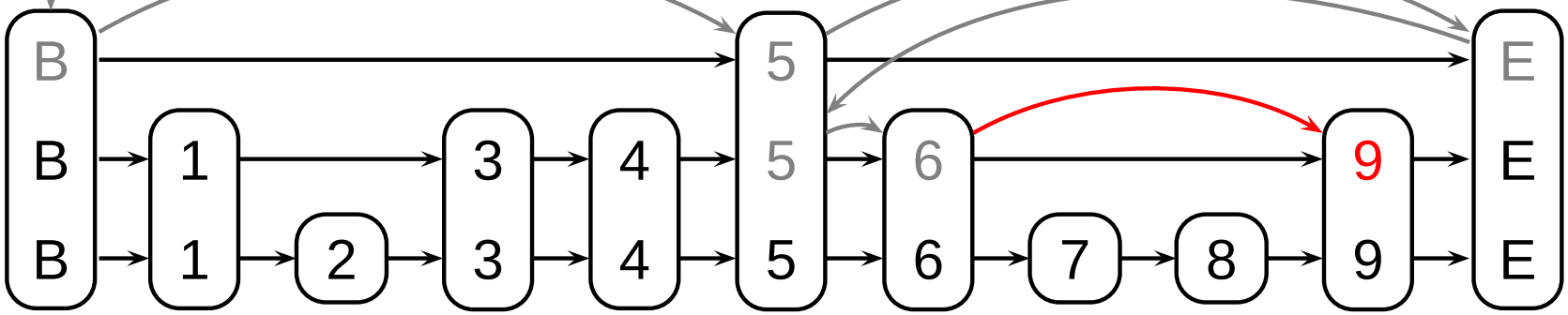
Wyszukujemy 8.



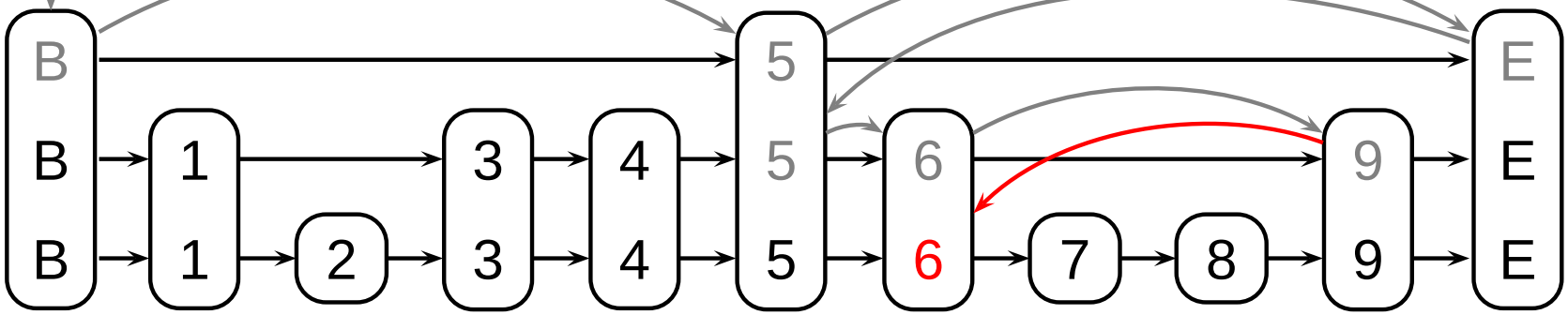
Wyszukujemy 8.



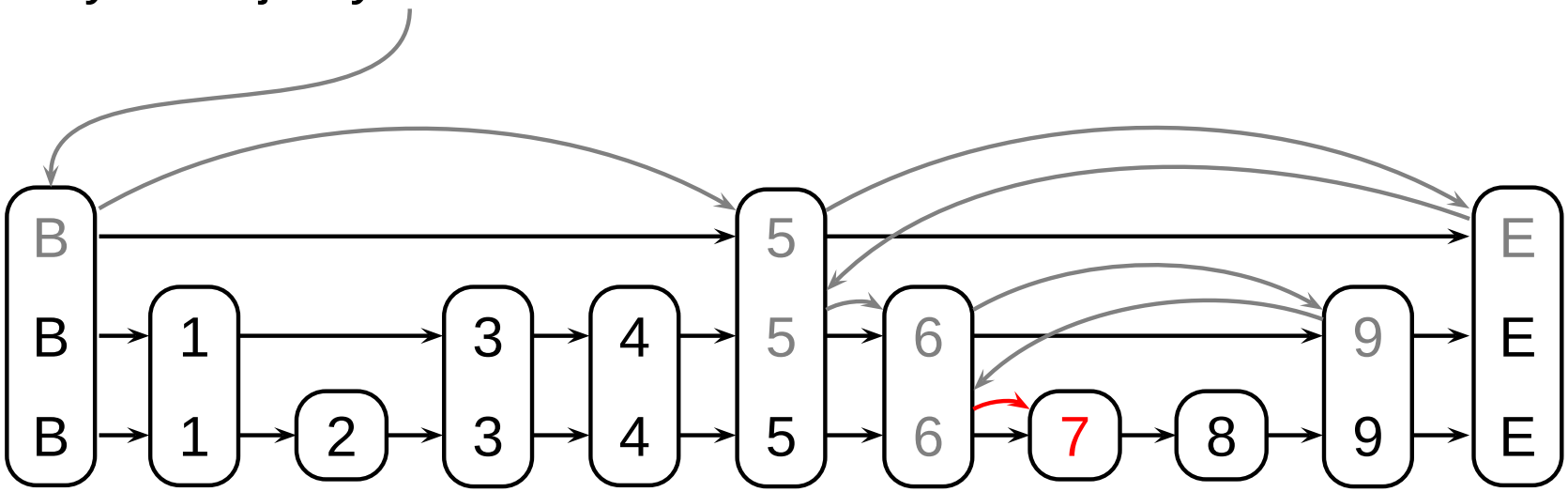
Wyszukujemy 8.



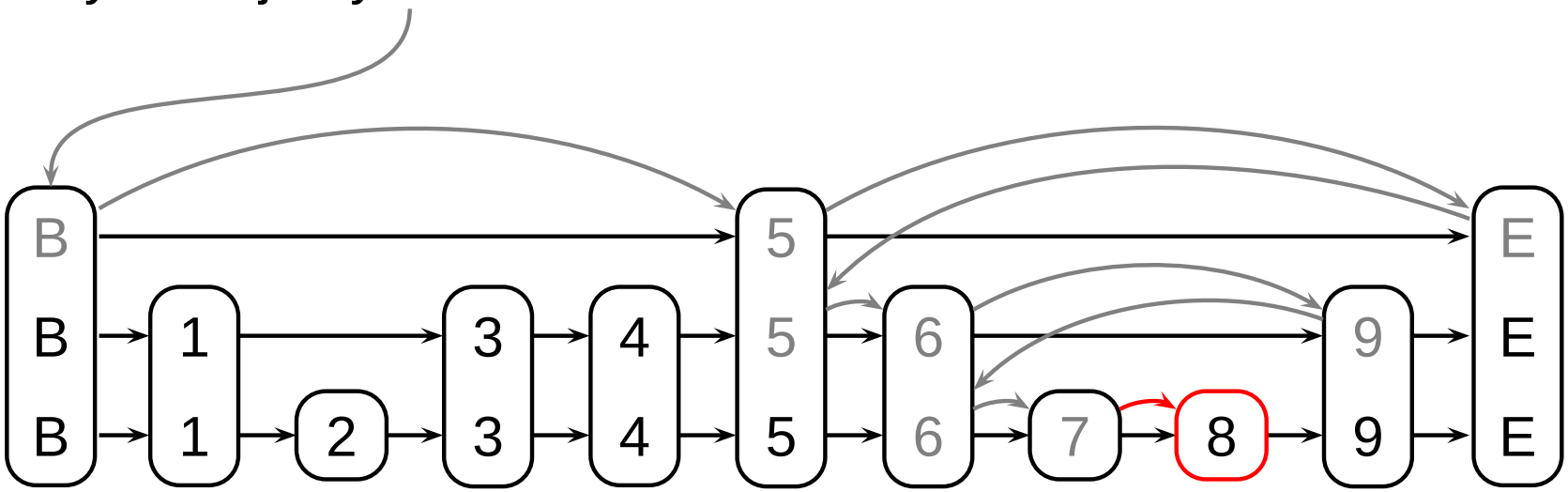
Wyszukujemy 8.



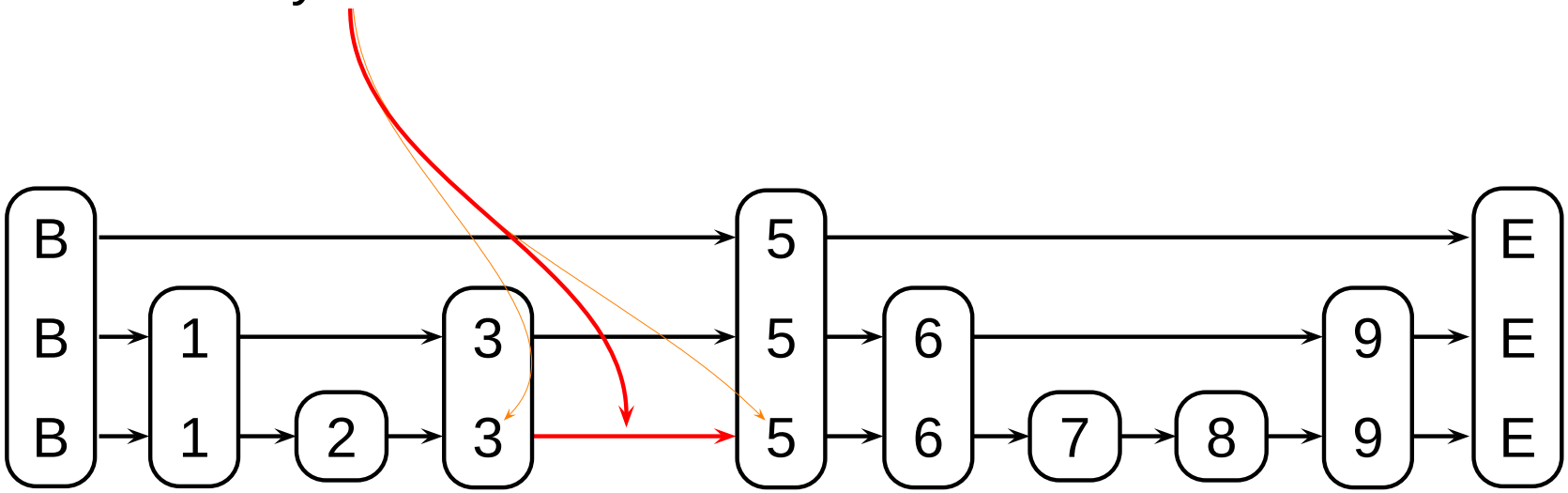
Wyszukujemy 8.



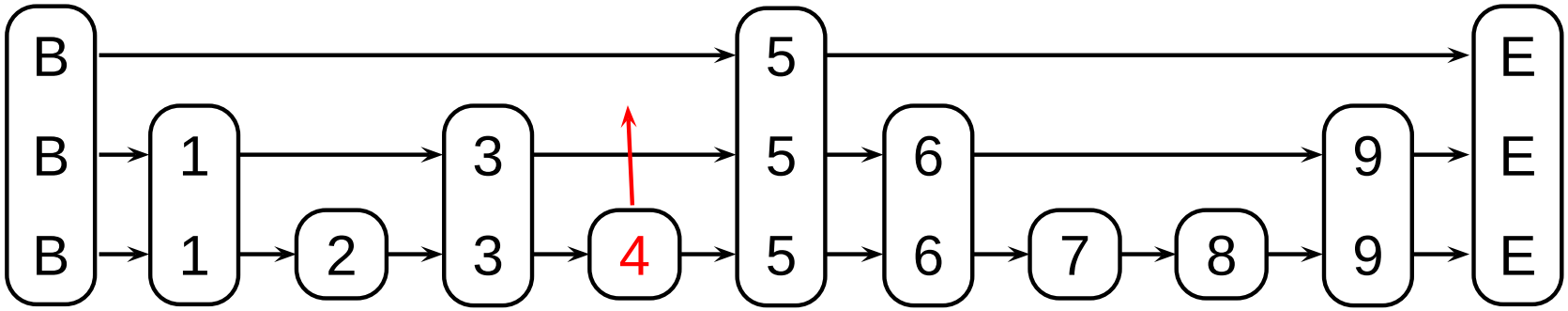
Wyszukujemy 8.



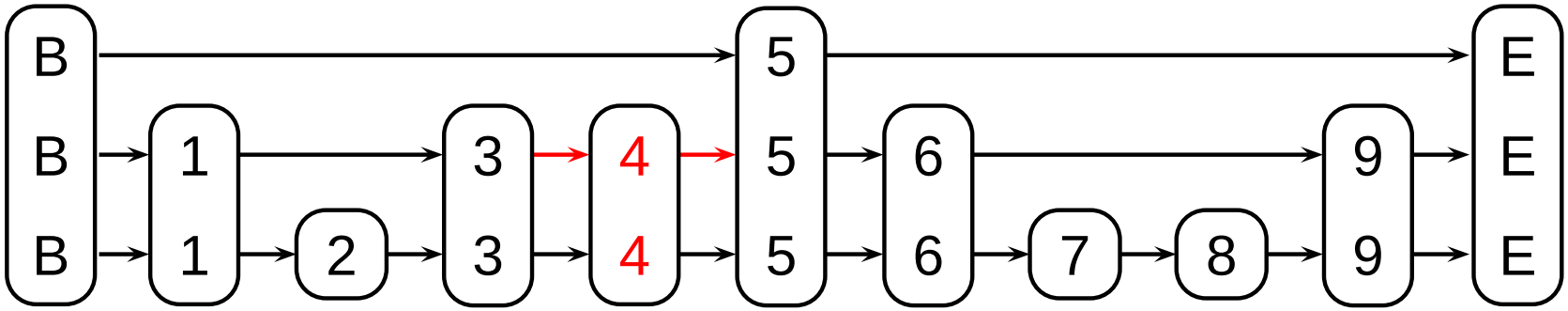
Wstawiamy 4.



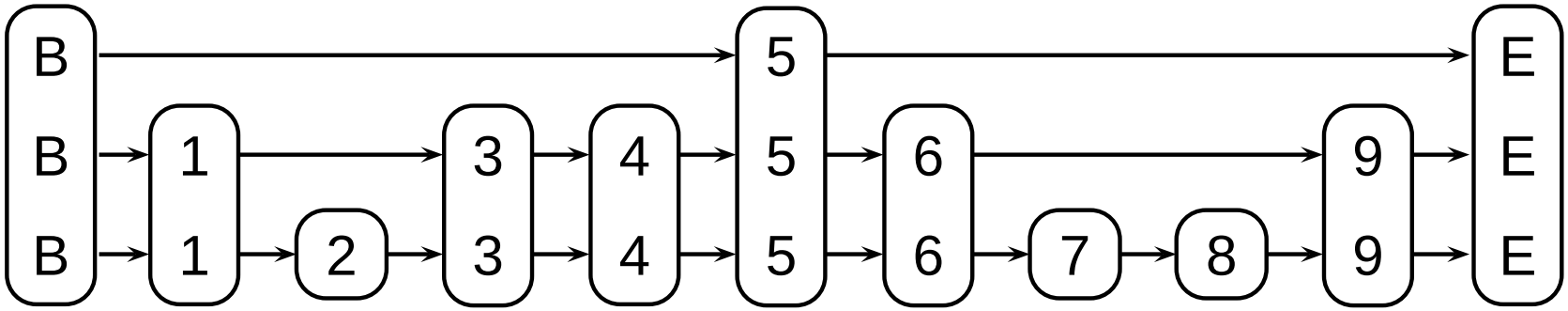
Wstawiamy 4.



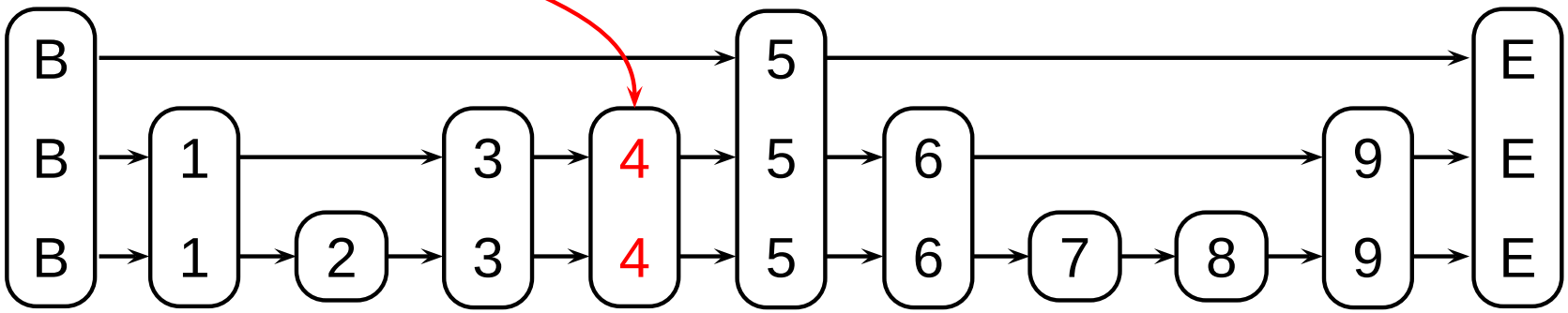
Wstawiamy 4.



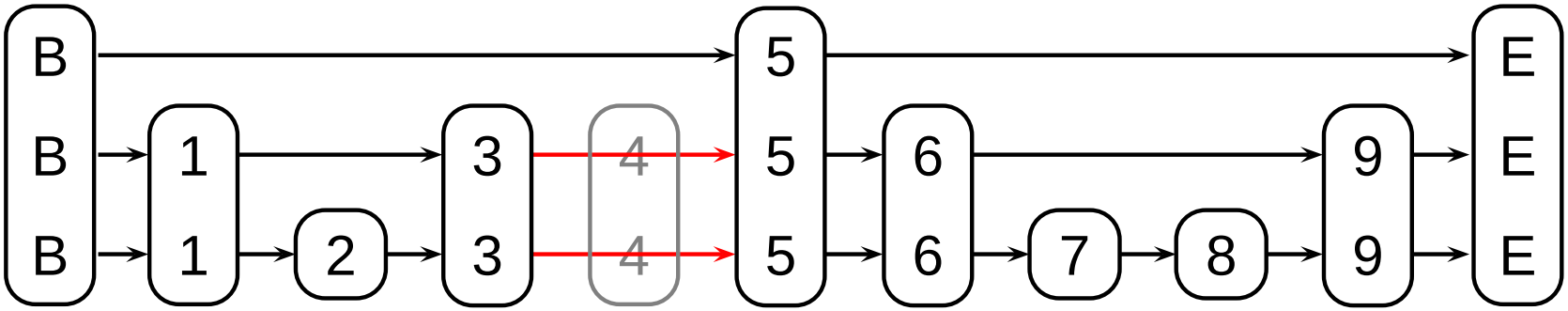
Wstawiamy 4.



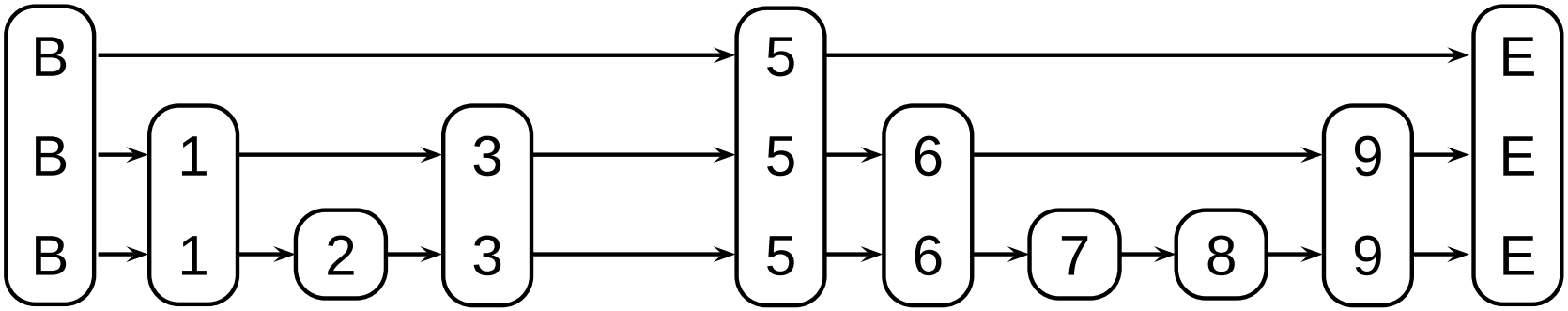
Usuwamy 4.



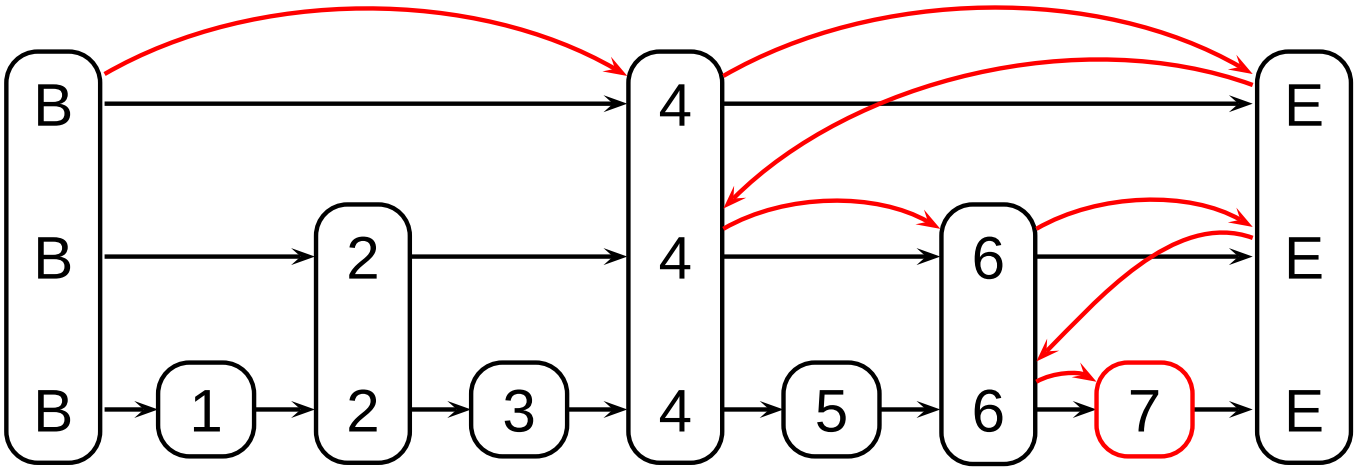
Usuwamy 4.



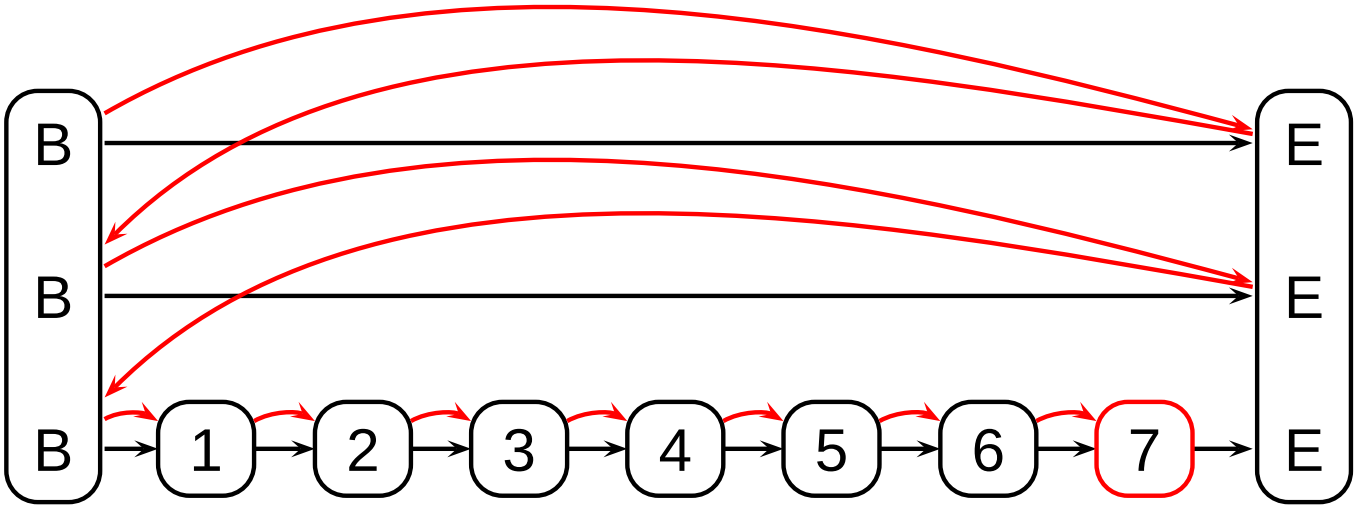
Usuwamy 4.



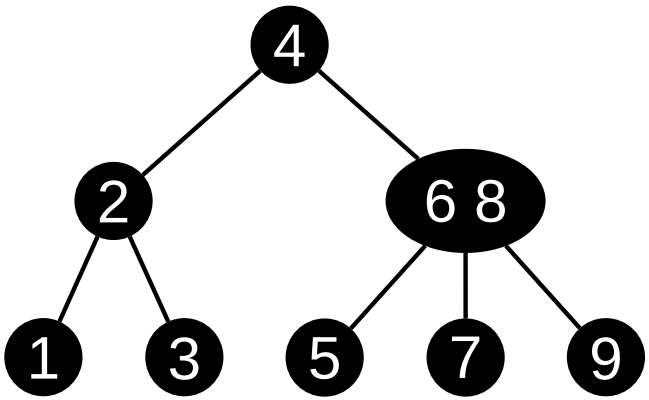
Wyszukiwanie w czasie logarytmicznym.



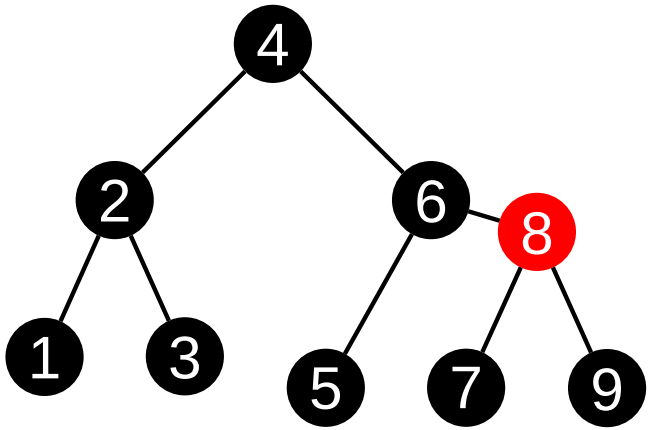
Wyszukiwanie w czasie liniowym.



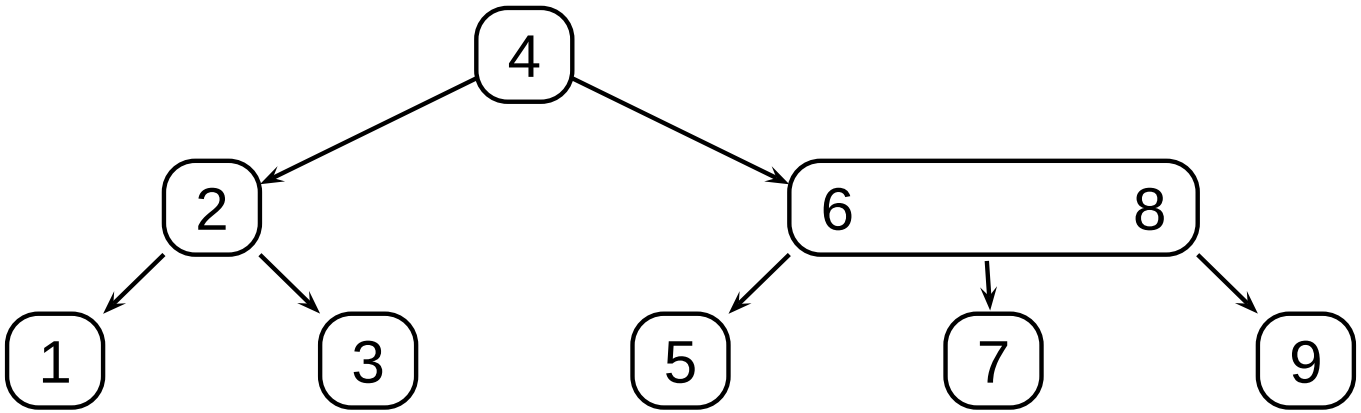
2-3 drzewo



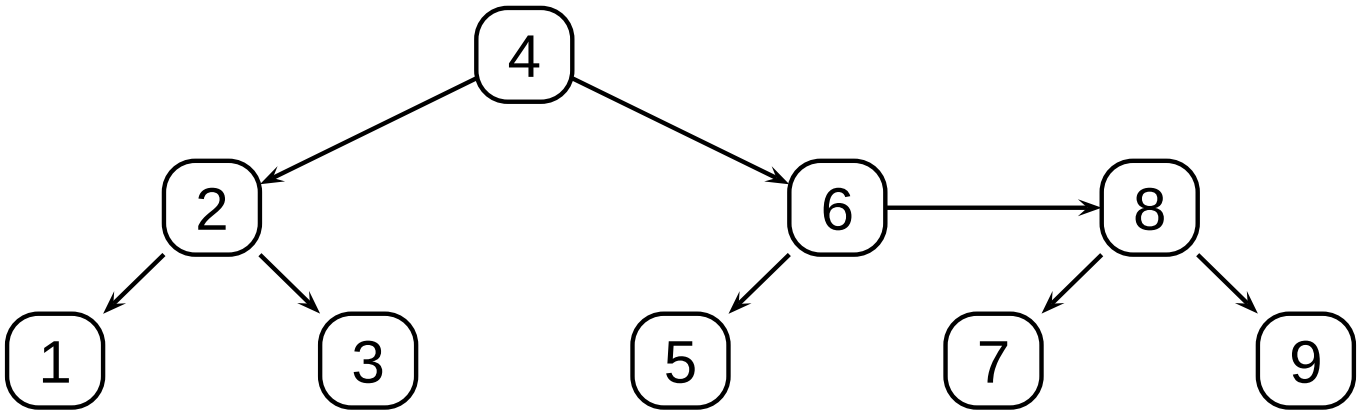
AA-drzewo



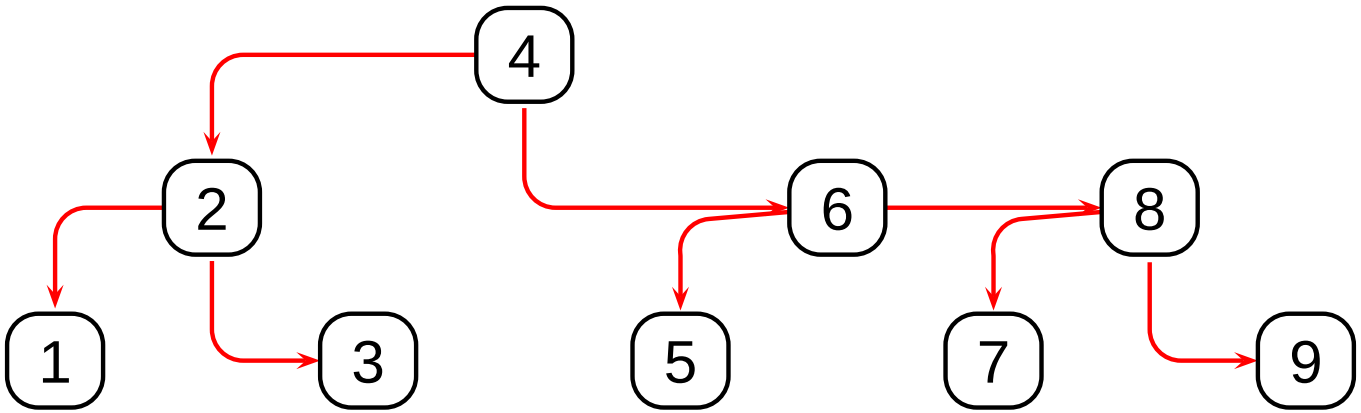
2-3 drzewo czyli 1-2 lista.



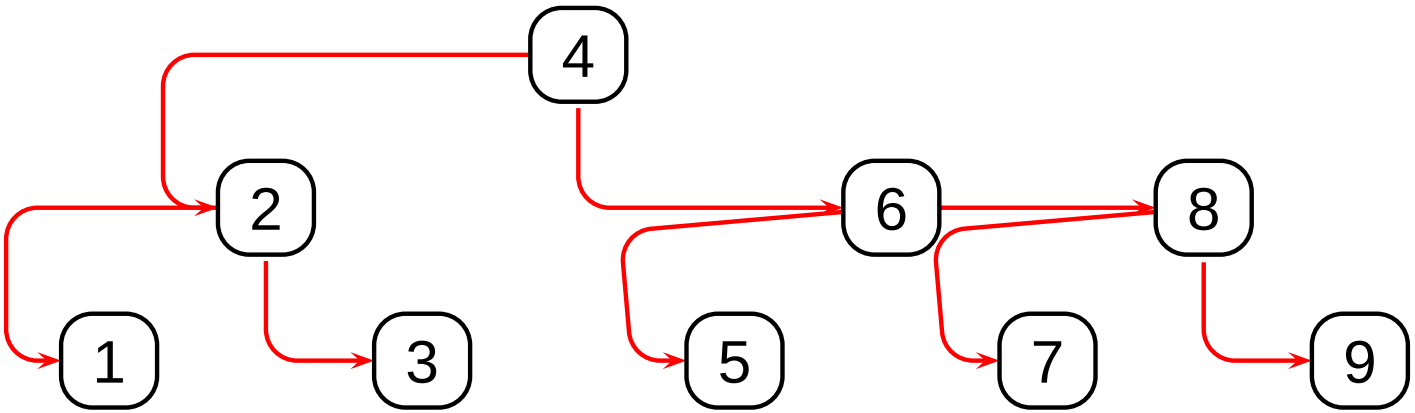
2-3 drzewo czyli 1-2 lista.



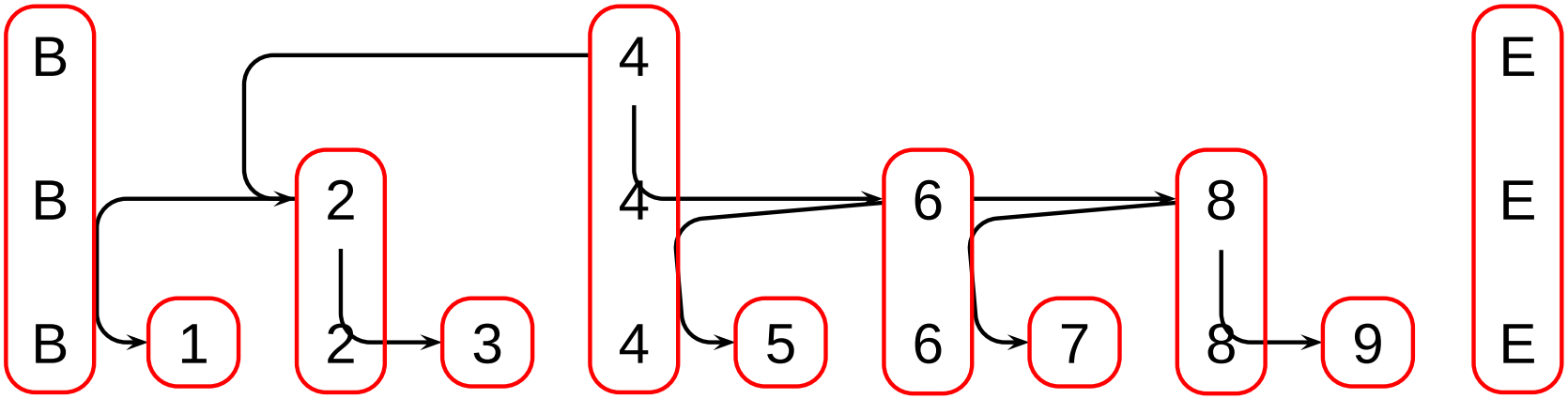
2-3 drzewo czyli 1-2 lista.



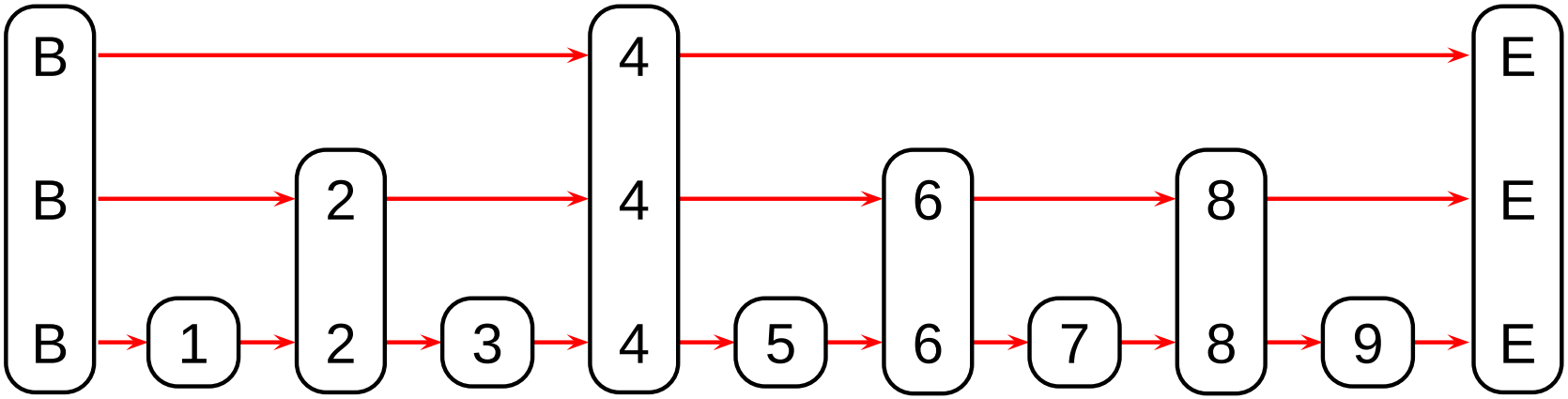
2-3 drzewo czyli 1-2 lista.



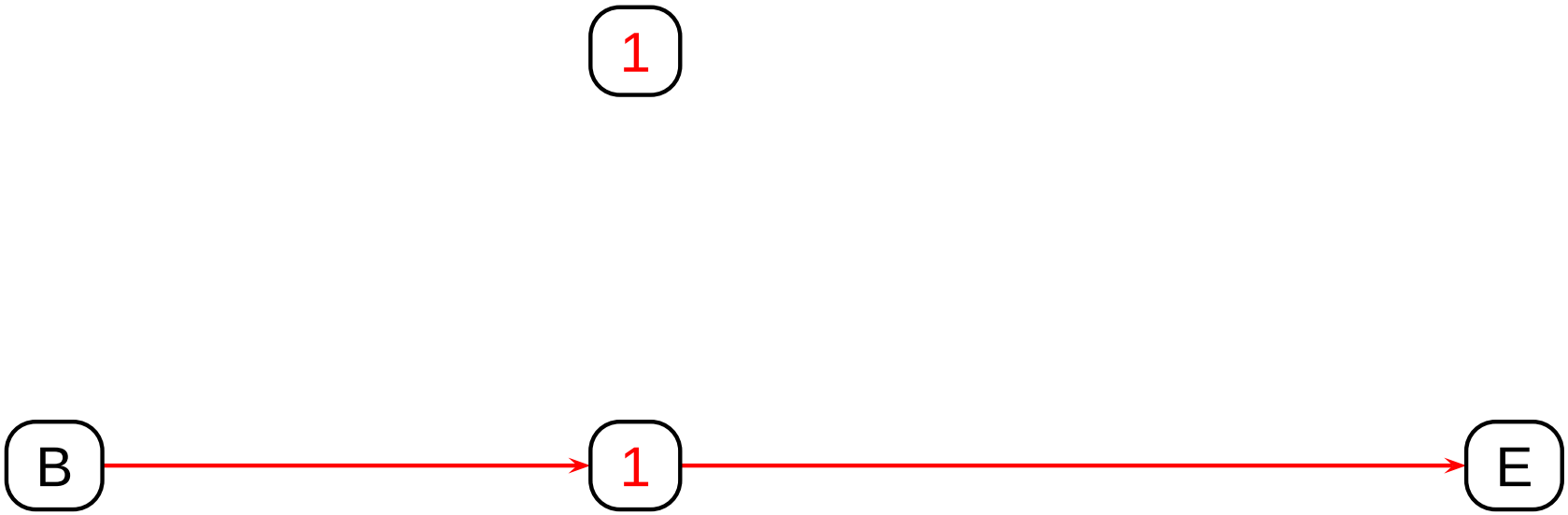
2-3 drzewo czyli 1-2 lista.



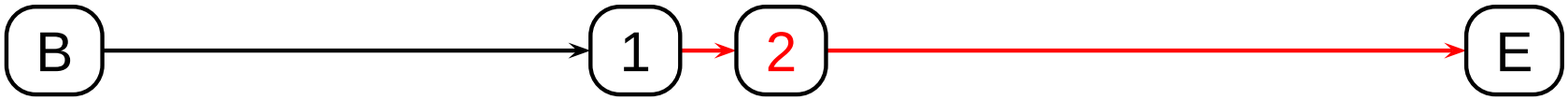
2-3 drzewo czyli 1-2 lista.



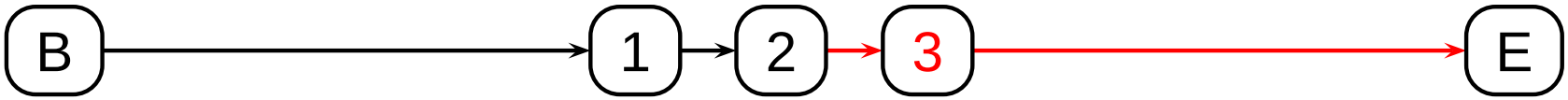
Wstawiamy $\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$.



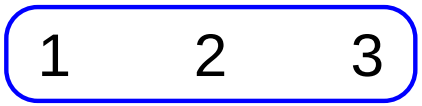
Wstawiamy $\{2, 3, 4, 5, 6, 7, 8, 9\}$.

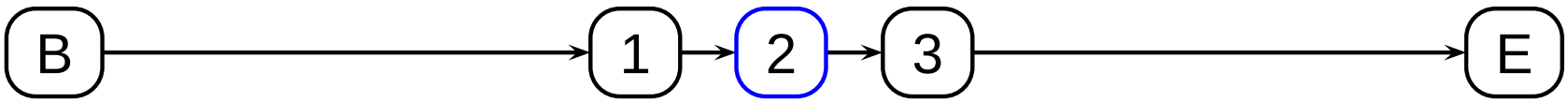


Wstawiamy $\{3, 4, 5, 6, 7, 8, 9\}$.

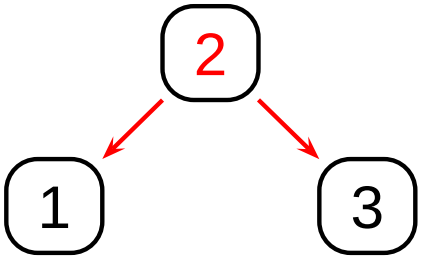


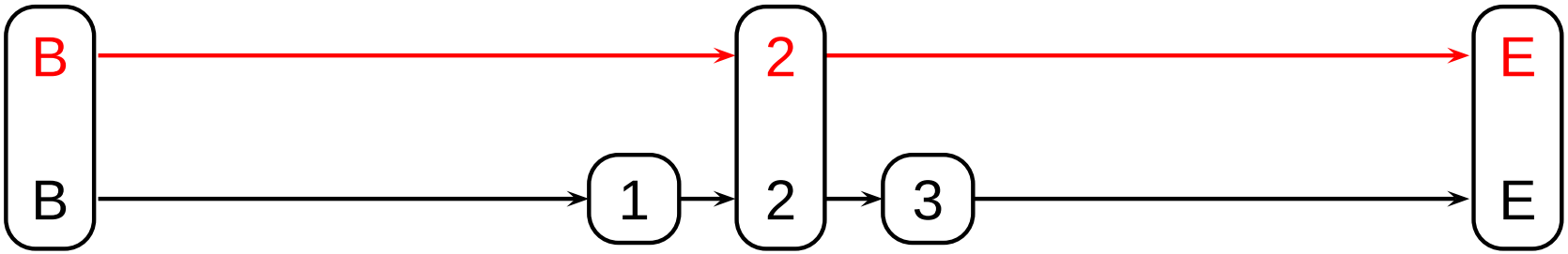
Wstawiamy $\{3, 4, 5, 6, 7, 8, 9\}$.



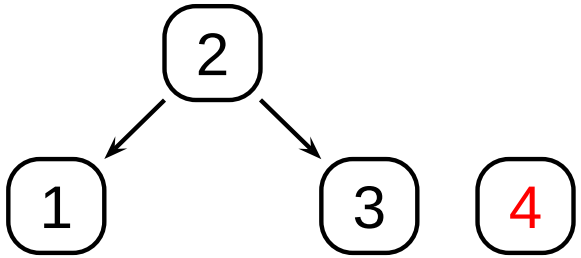


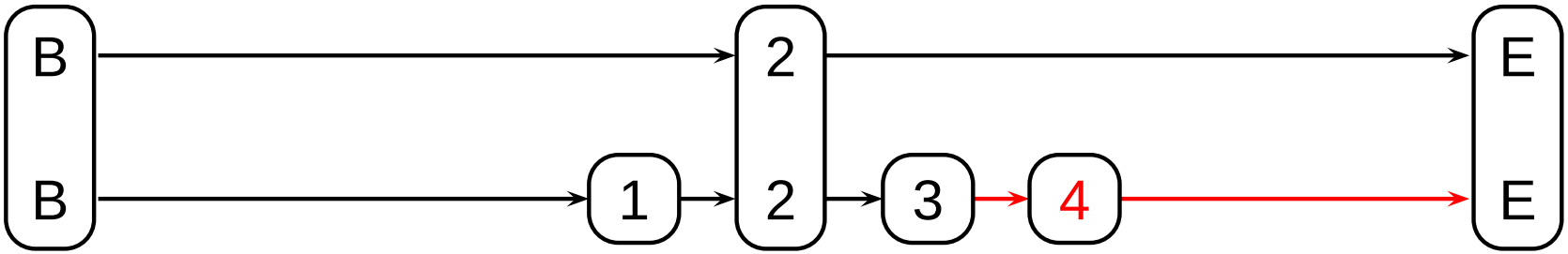
Wstawiamy $\{3, 4, 5, 6, 7, 8, 9\}$.



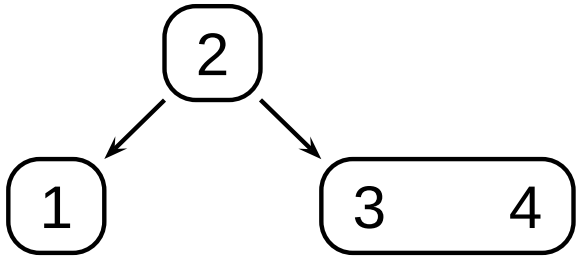


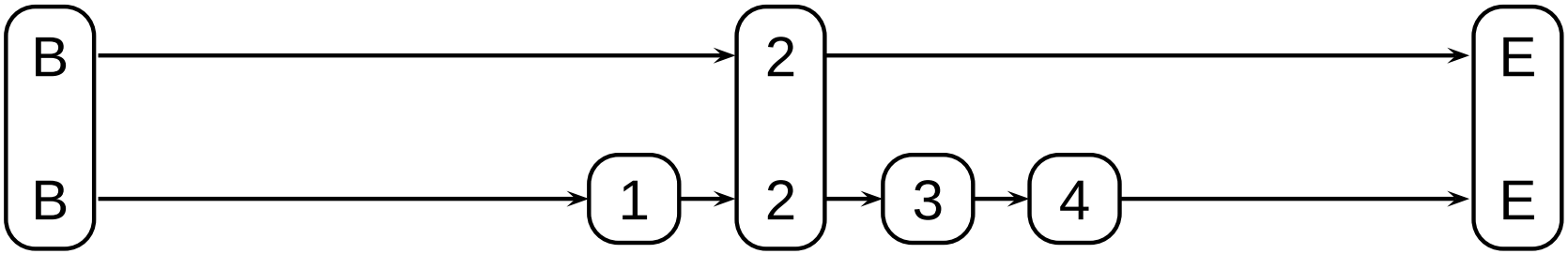
Wstawiamy $\{4, 5, 6, 7, 8, 9\}$.



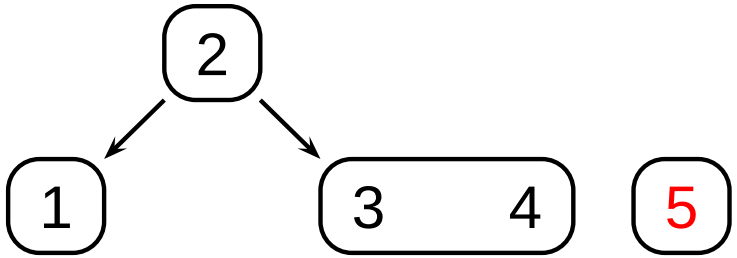


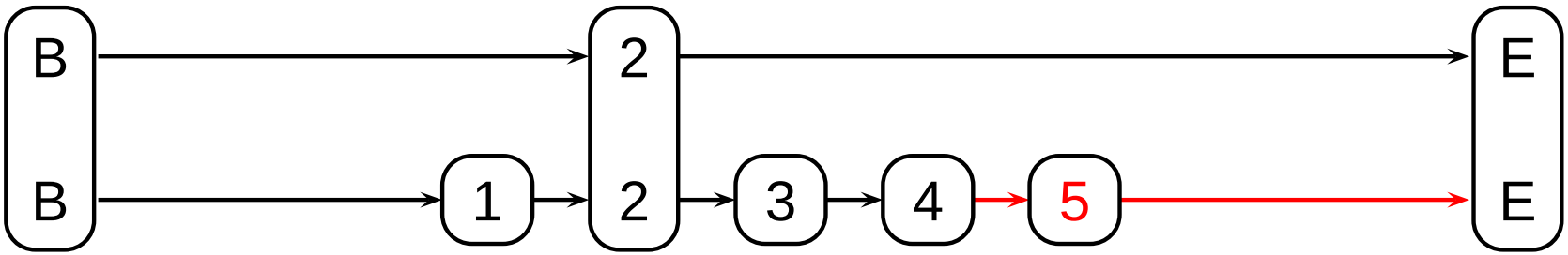
Wstawiamy $\{4, 5, 6, 7, 8, 9\}$.



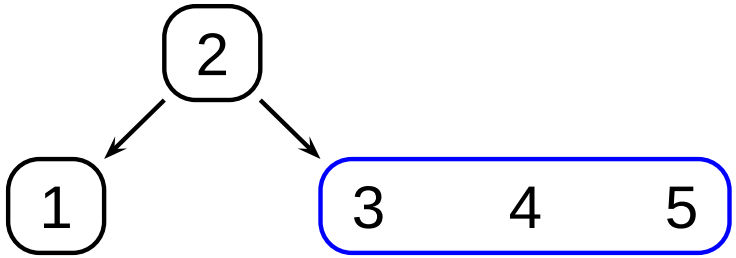


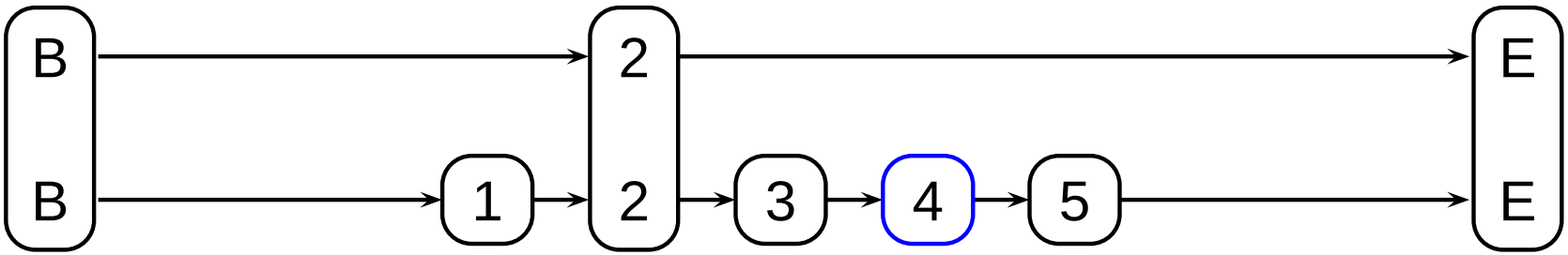
Wstawiamy $\{5, 6, 7, 8, 9\}$.



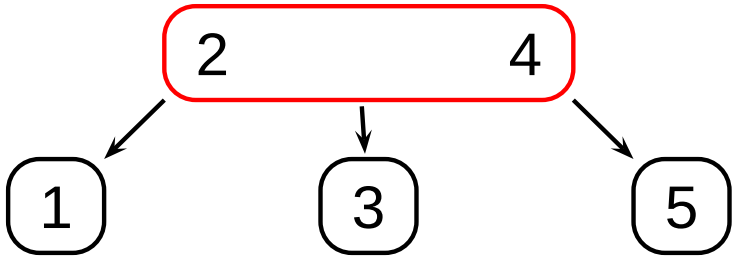


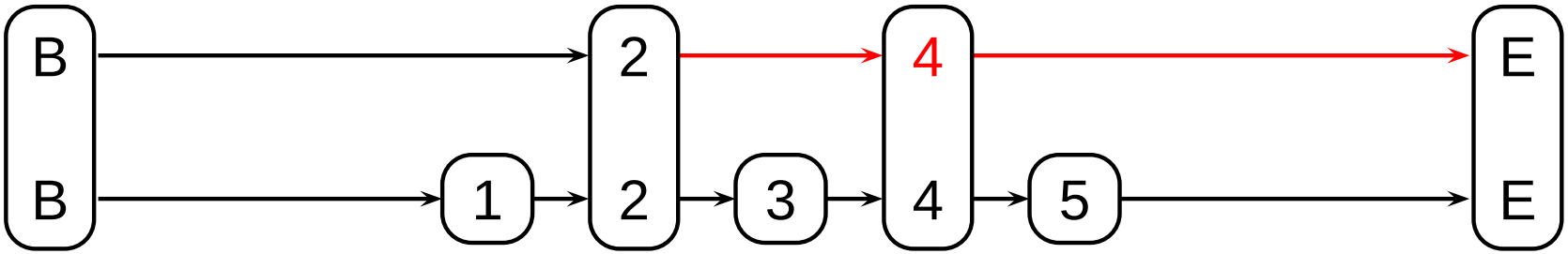
Wstawiamy $\{5, 6, 7, 8, 9\}$.



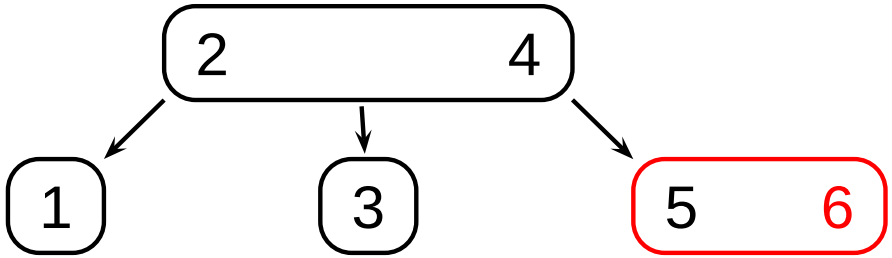


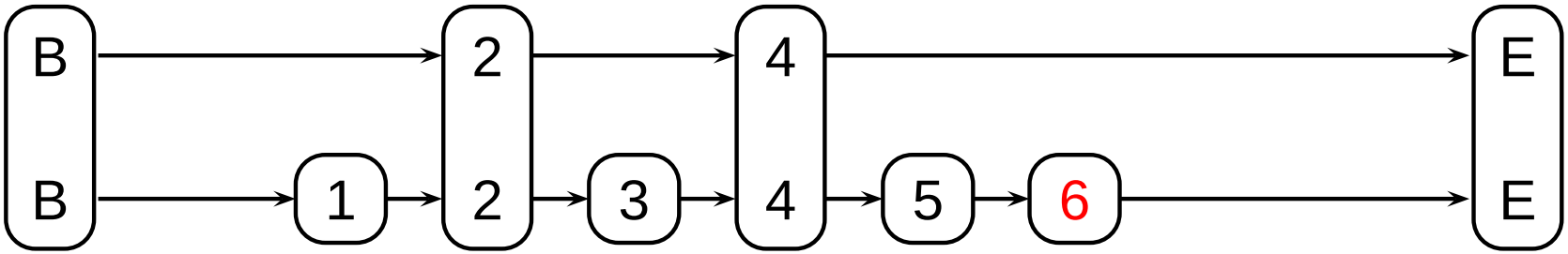
Wstawiamy $\{5, 6, 7, 8, 9\}$.



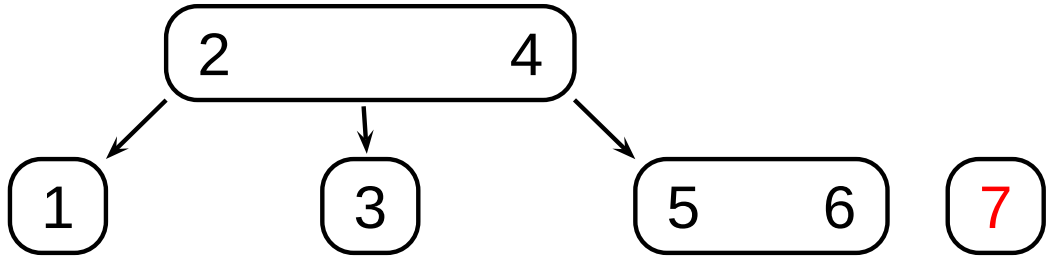


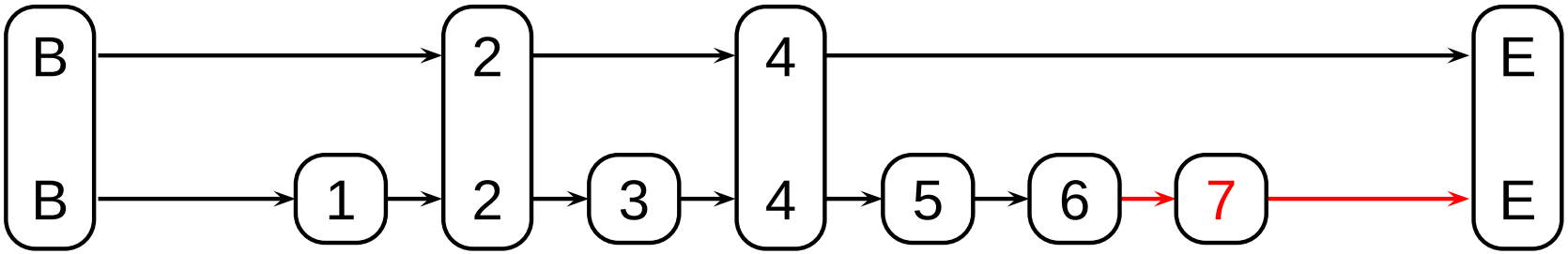
Wstawiamy $\{6, 7, 8, 9\}$.



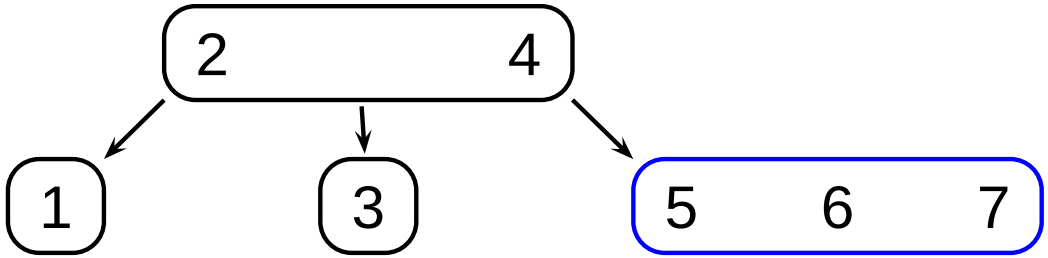


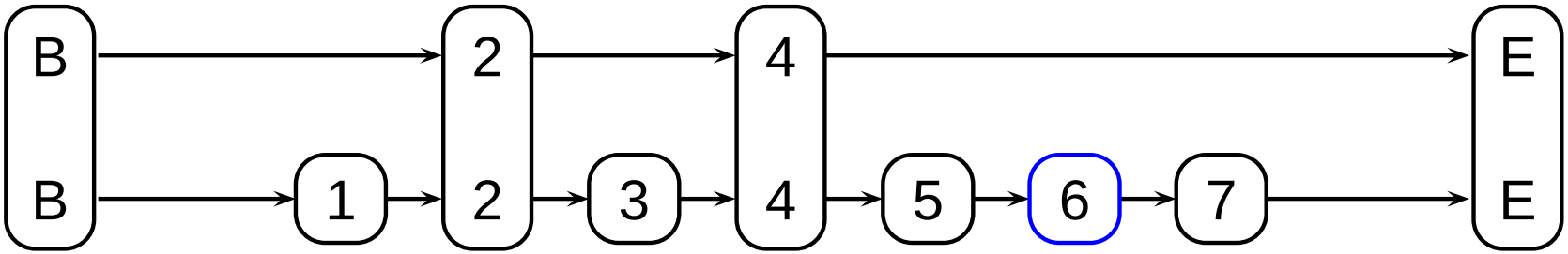
Wstawiamy $\{7, 8, 9\}$.



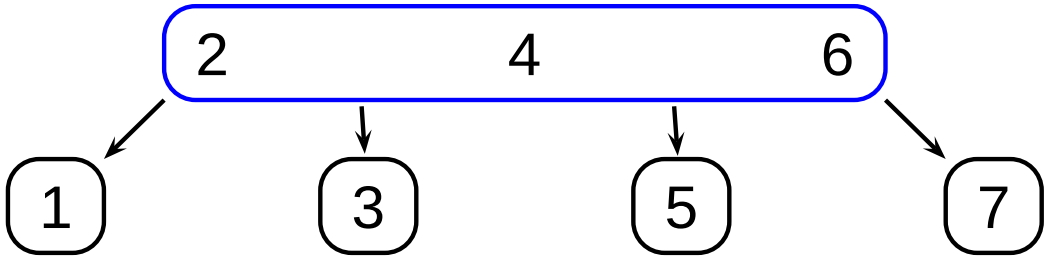


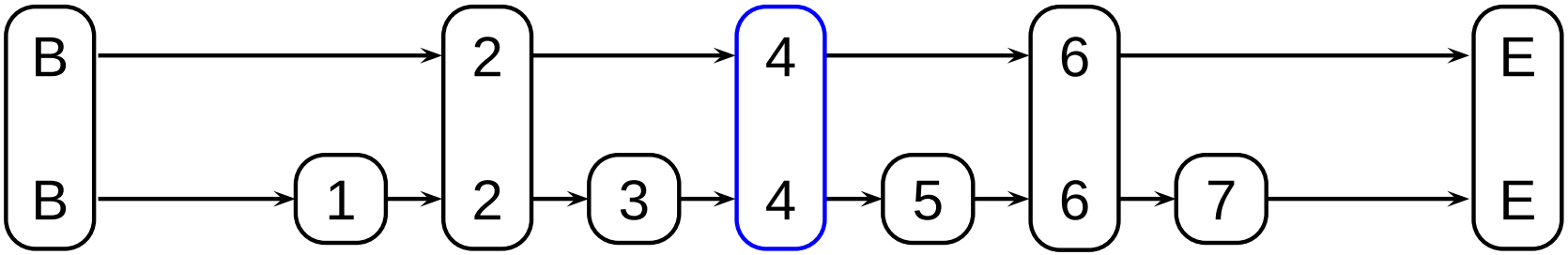
Wstawiamy $\{7, 8, 9\}$.



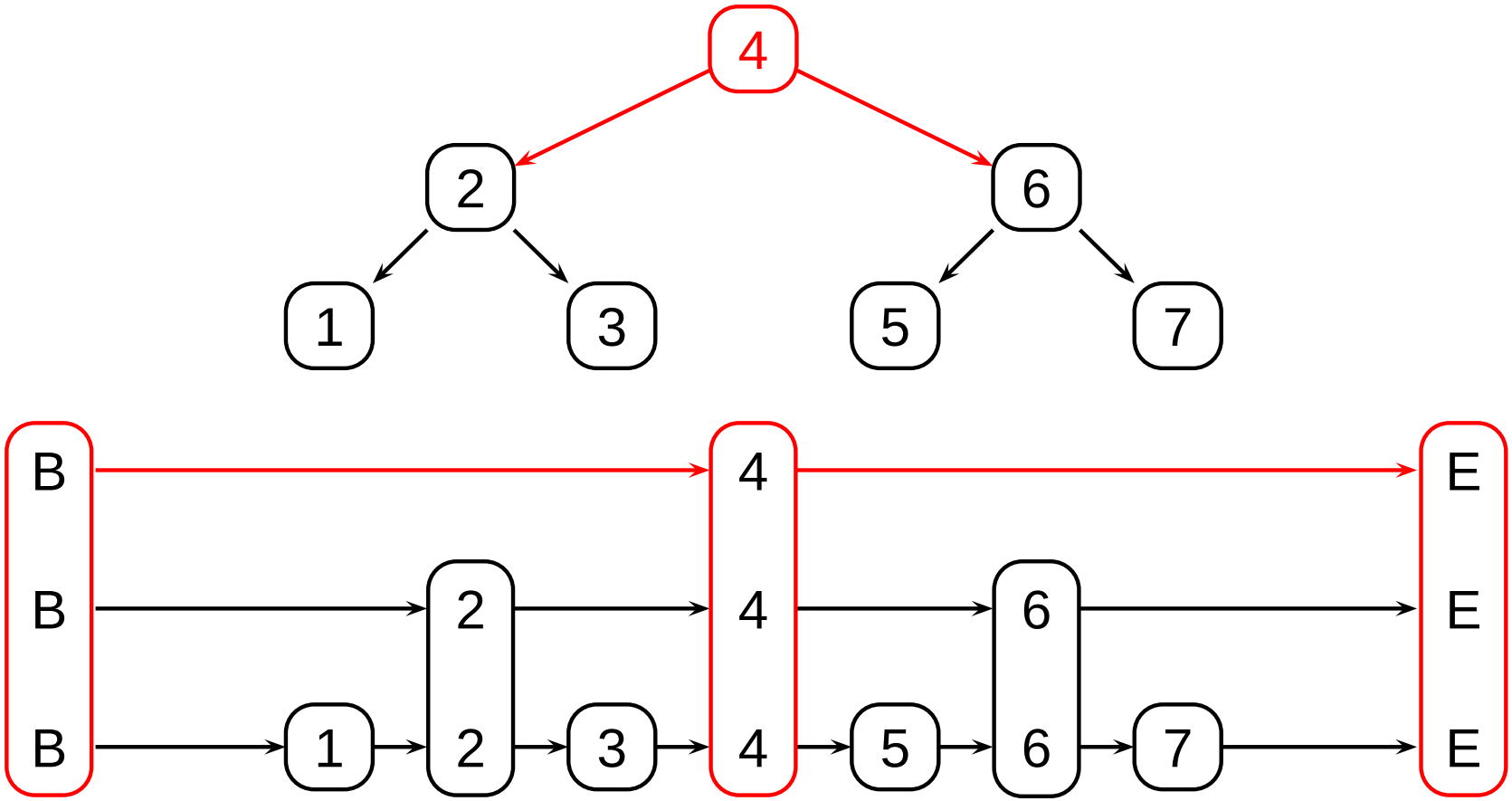


Wstawiamy $\{7, 8, 9\}$.

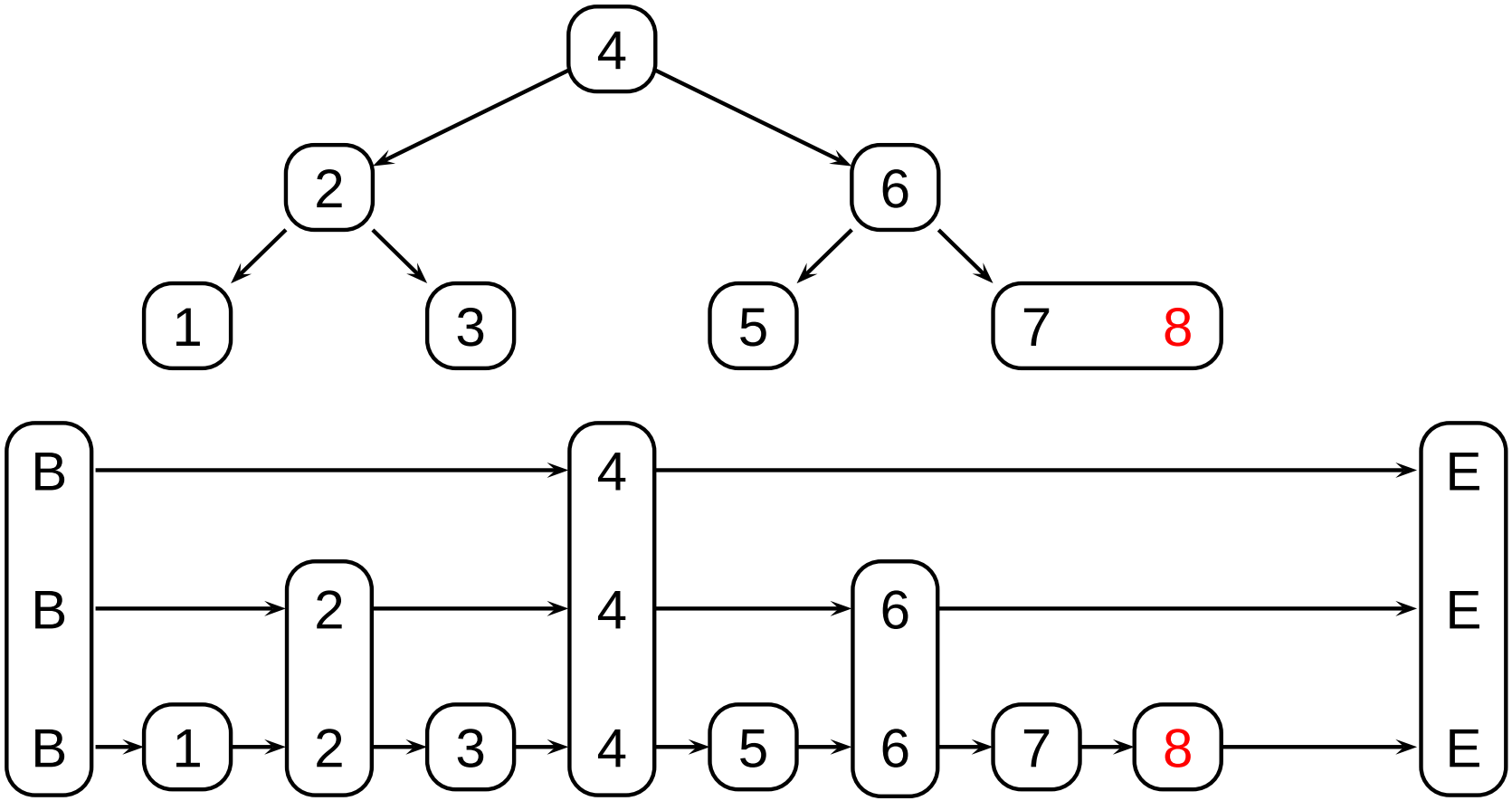




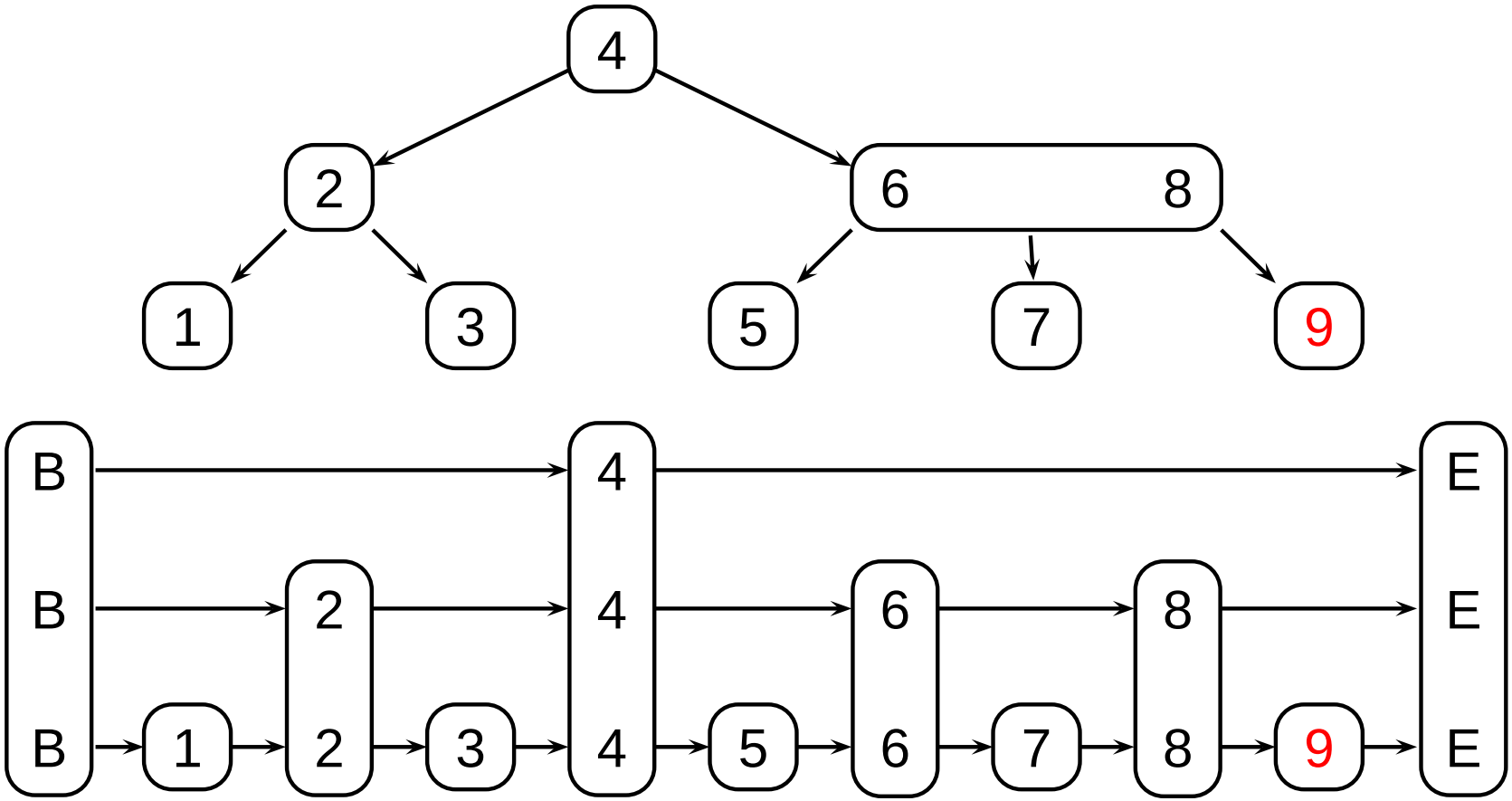
Wstawiamy $\{7, 8, 9\}$.



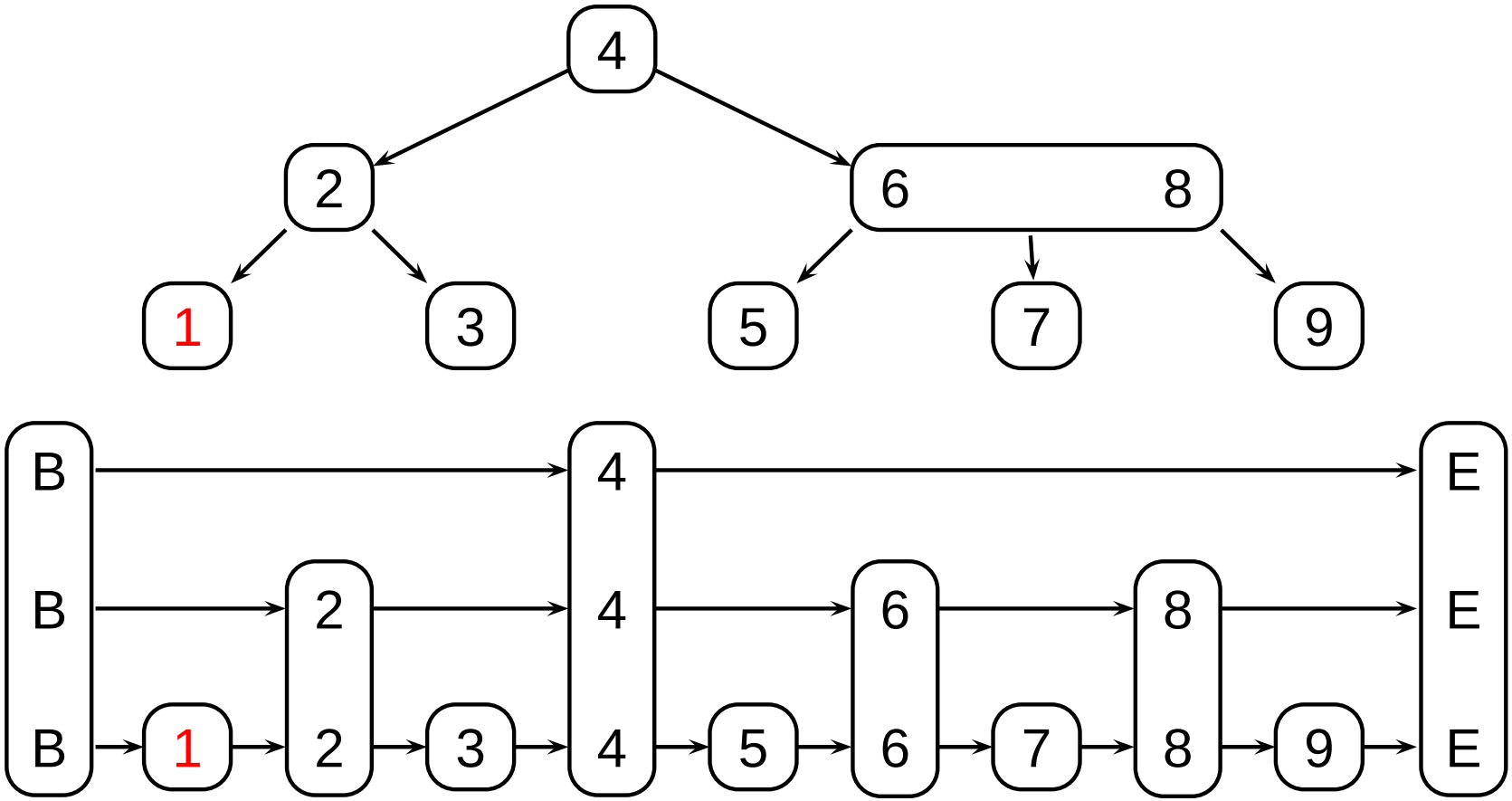
Wstawiamy $\{8, 9\}$.



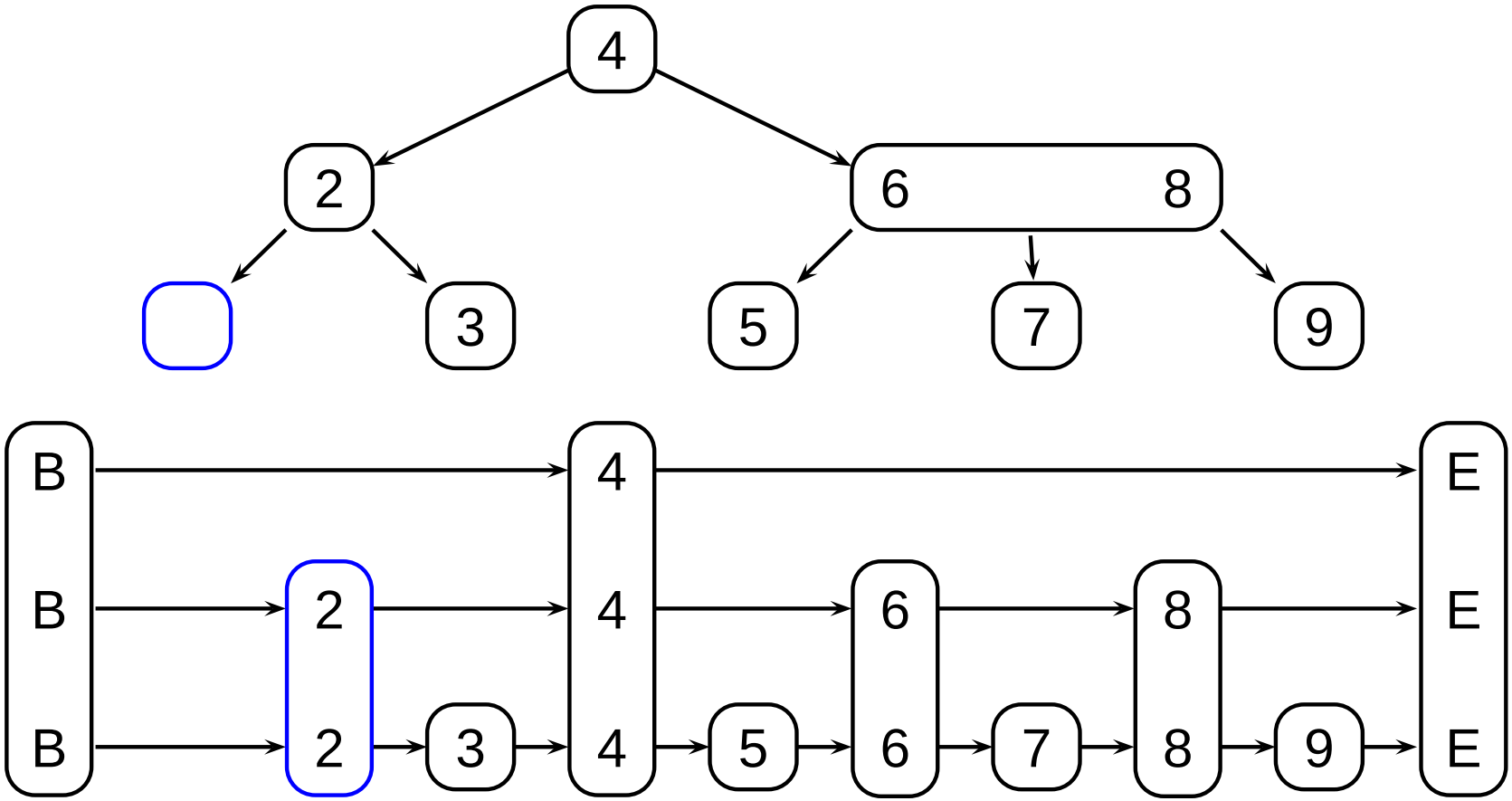
Wstawiamy $\{9\}$.



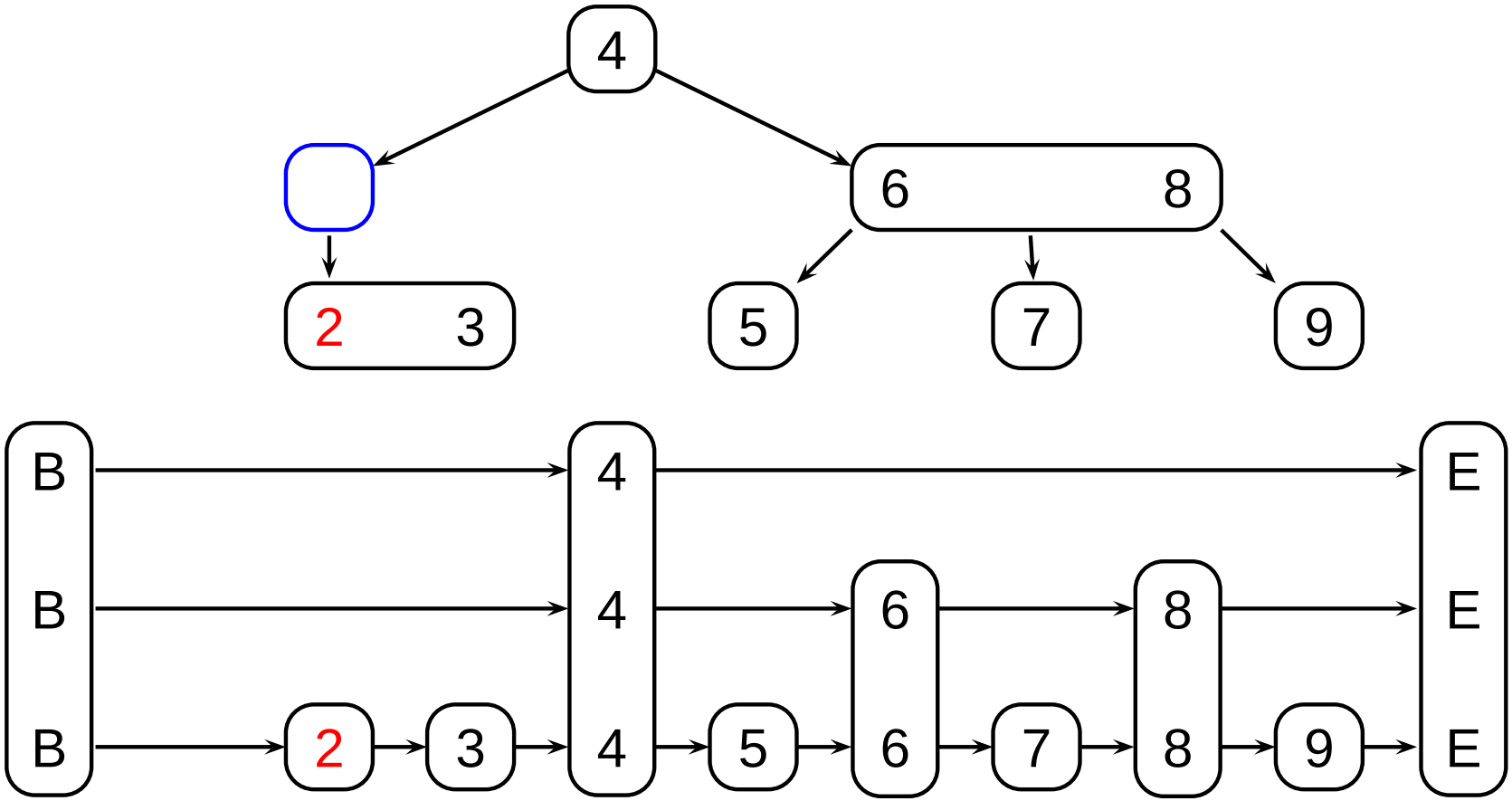
Usuwanie $\{1, 2, 3\}$.



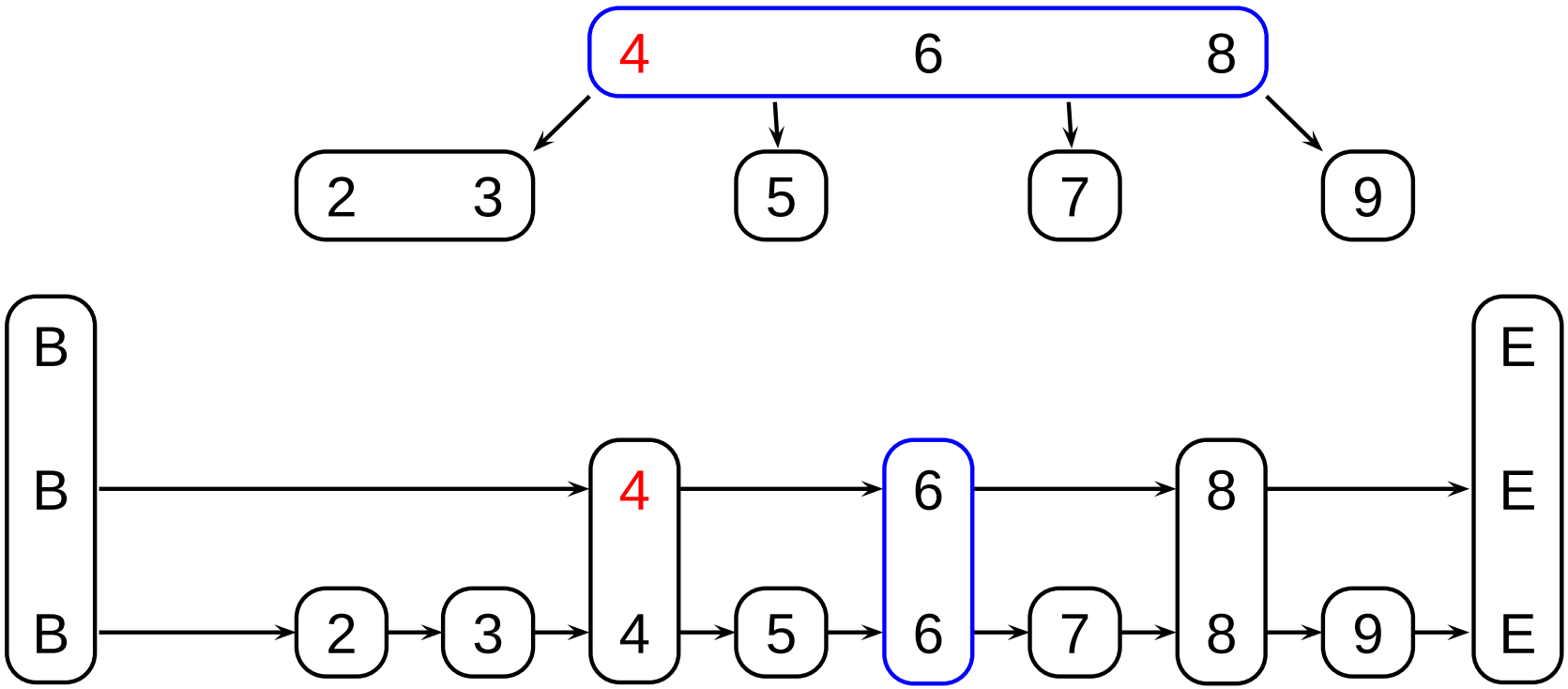
Usuwanie $\{1, 2, 3\}$.



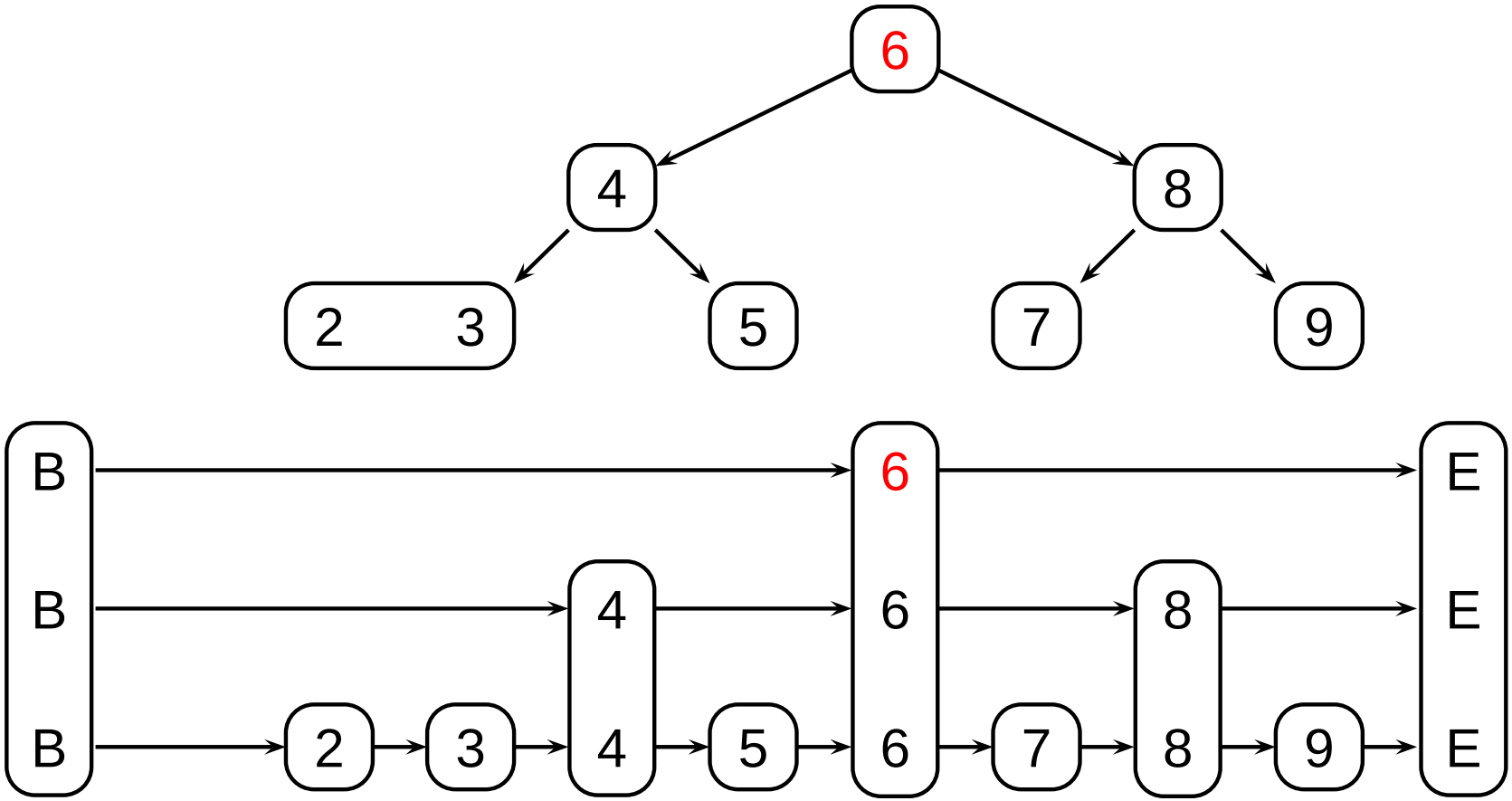
Usuwanie $\{1, 2, 3\}$.



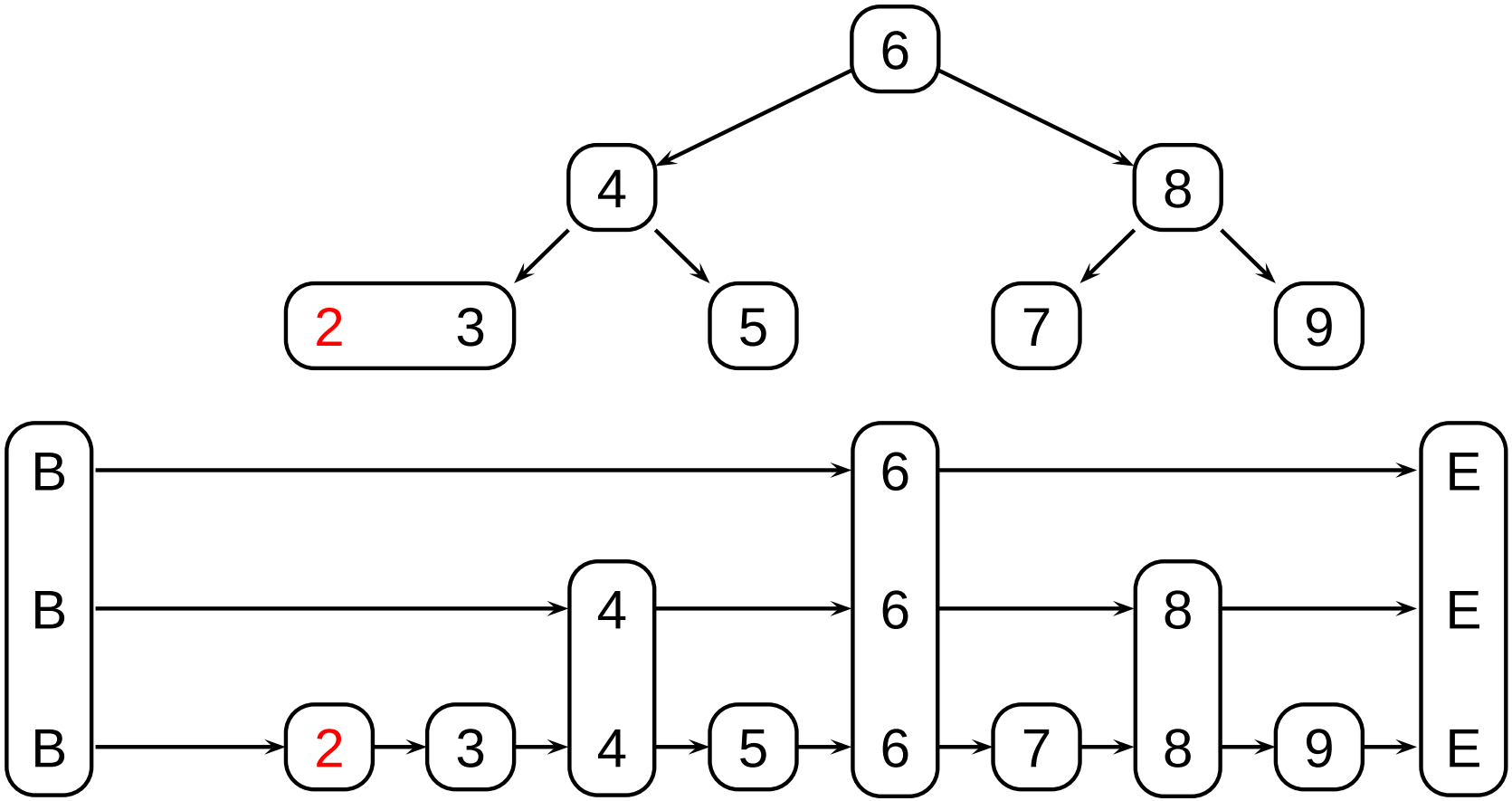
Usuwanie $\{1, 2, 3\}$.



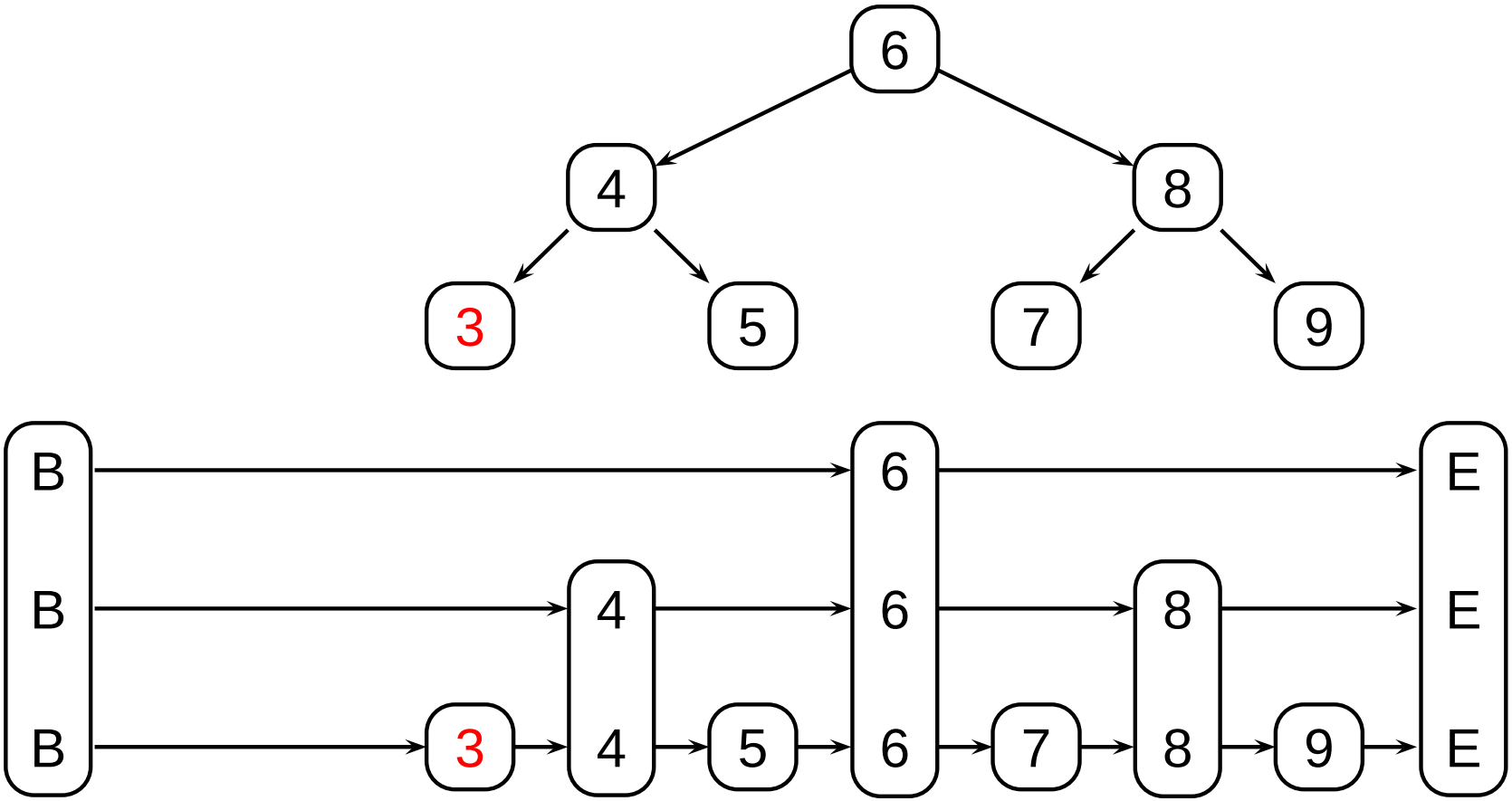
Usuwanie $\{1, 2, 3\}$.



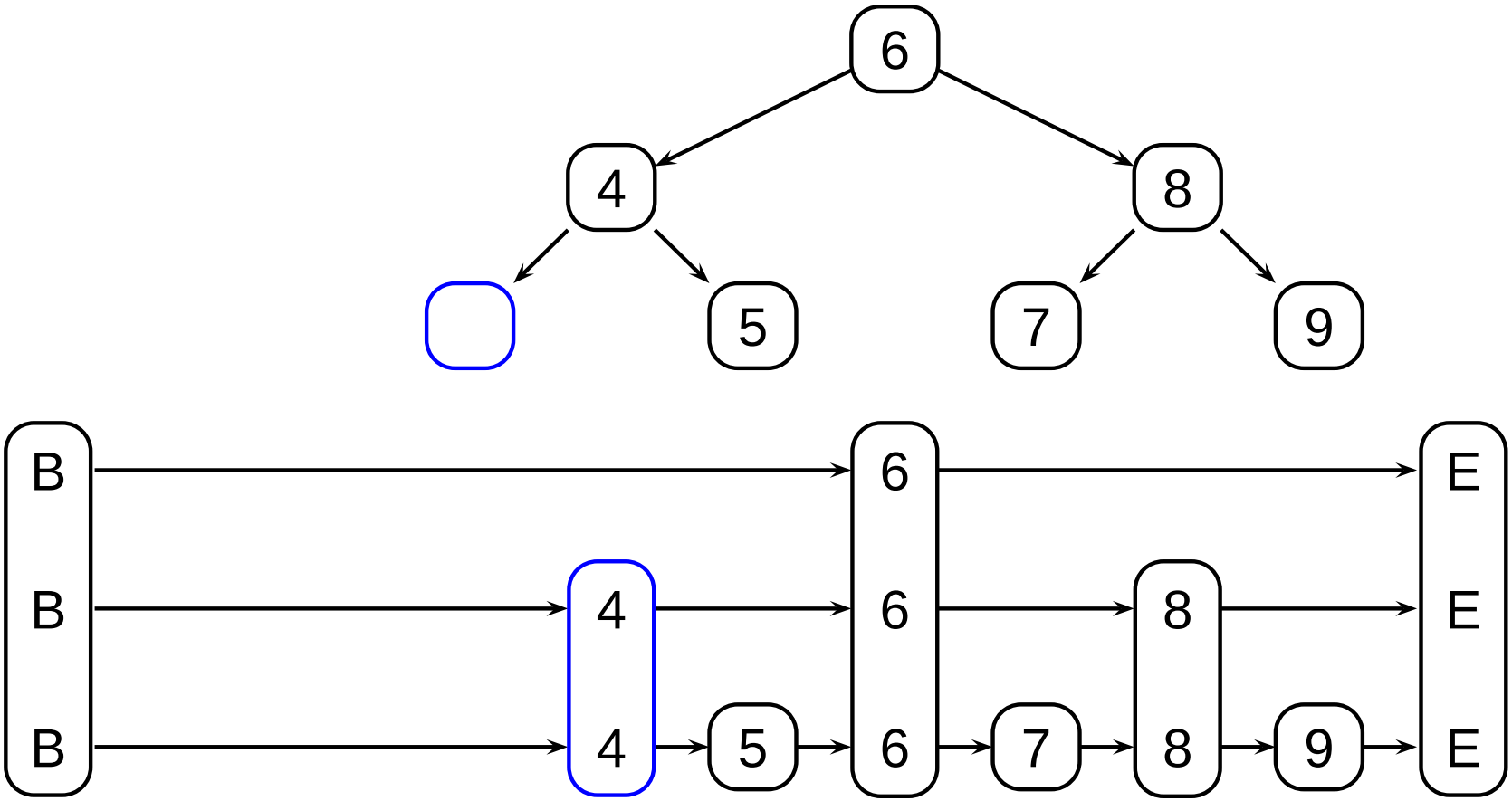
Usuwanie $\{2, 3\}$.



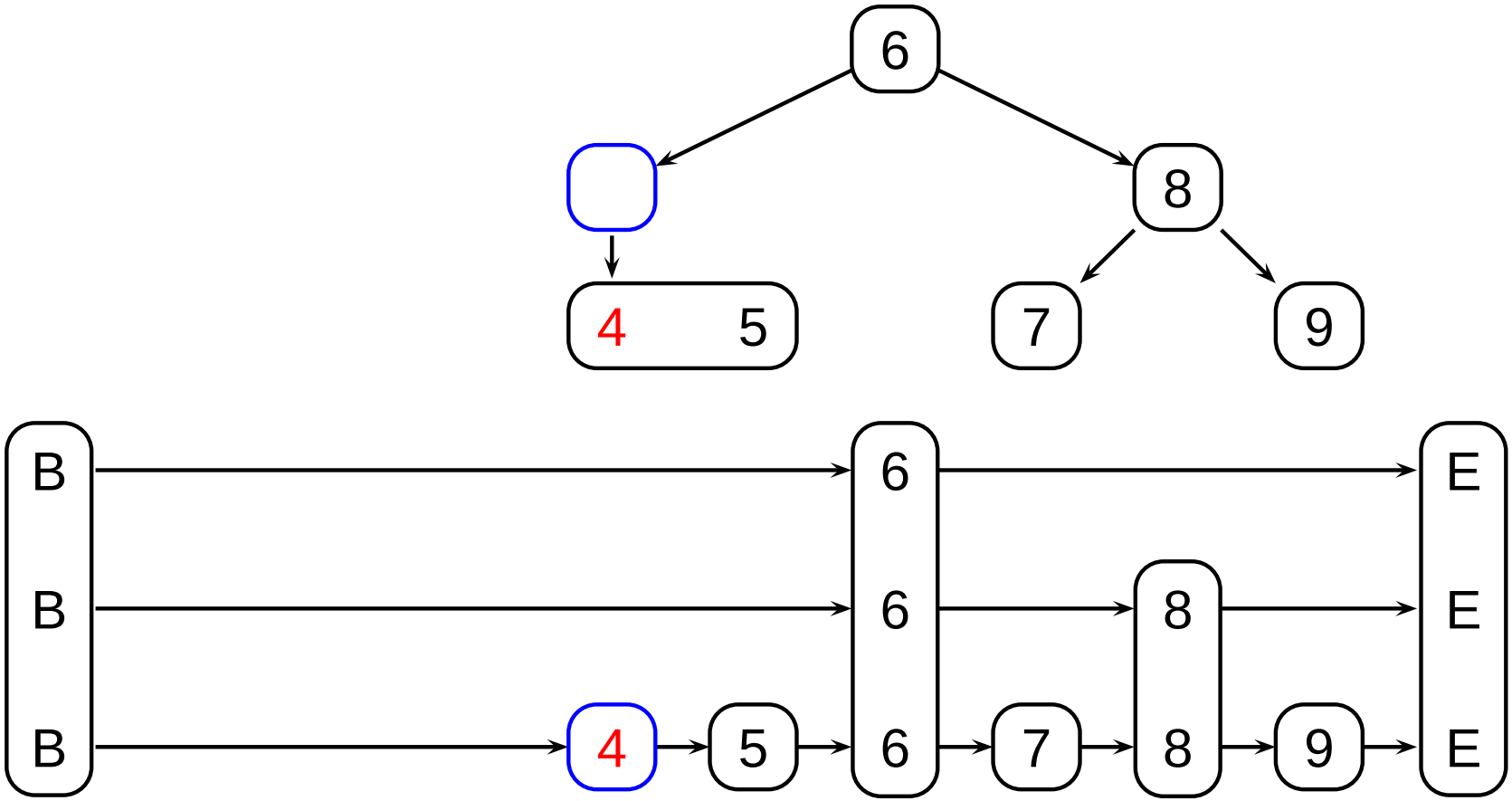
Usuwanie $\{3\}$.



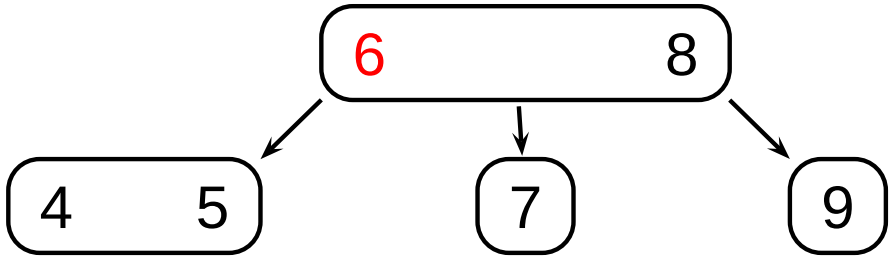
Usuwanie $\{3\}$.

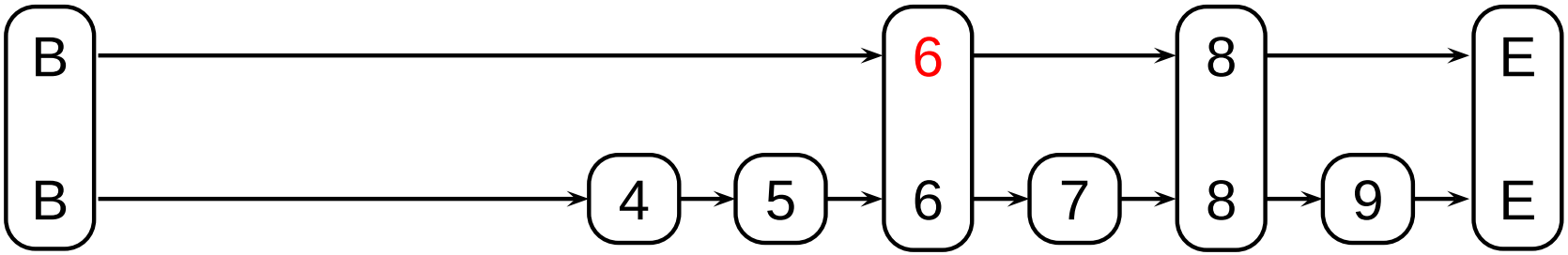


Usuwanie $\{3\}$.

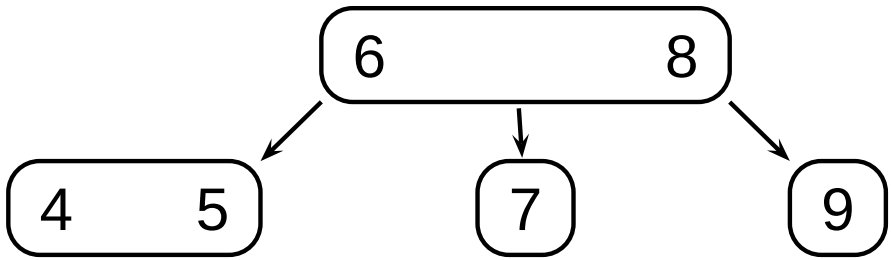


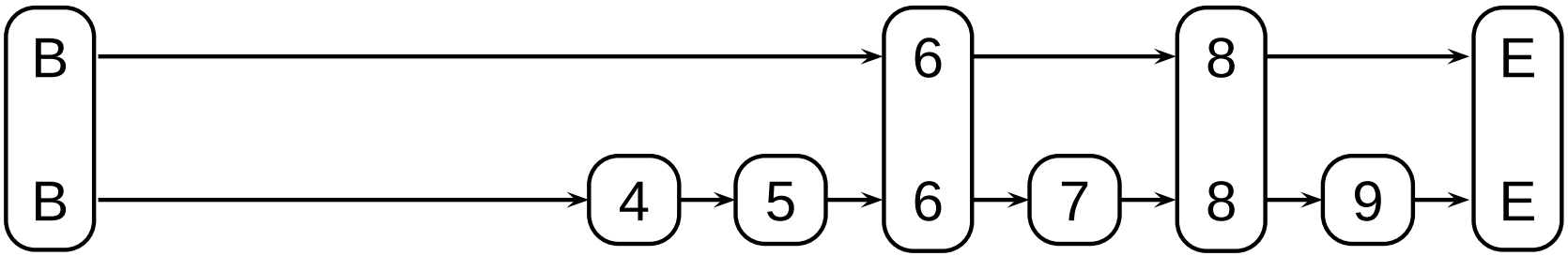
Usuwanie $\{3\}$.



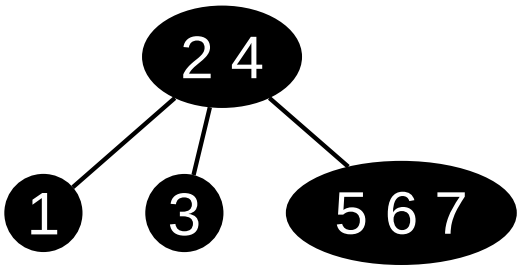


Usuwanie {}.

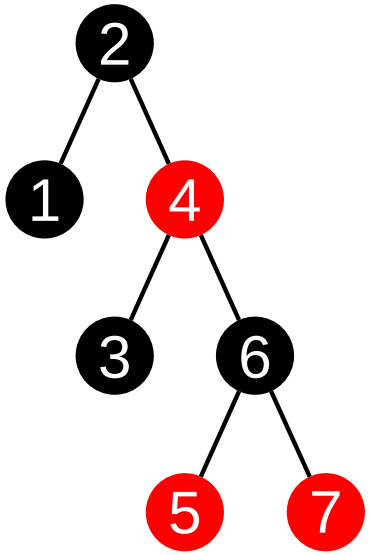




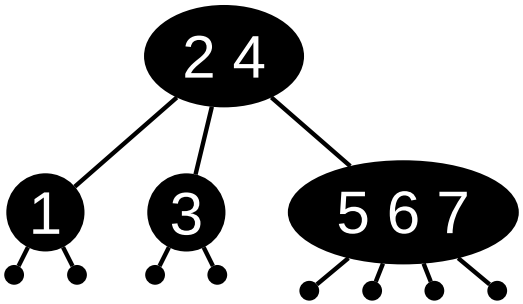
2-3-4 drzewo



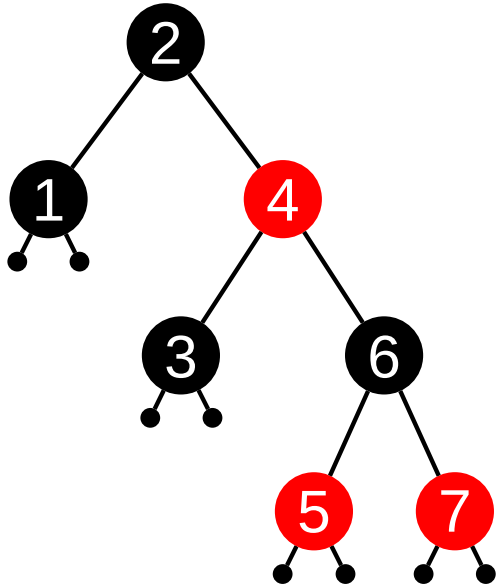
Drzewo czerwono-czarne



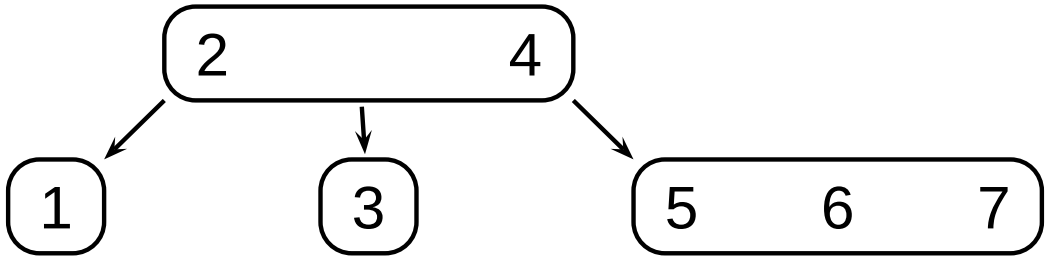
2-3-4 drzewo

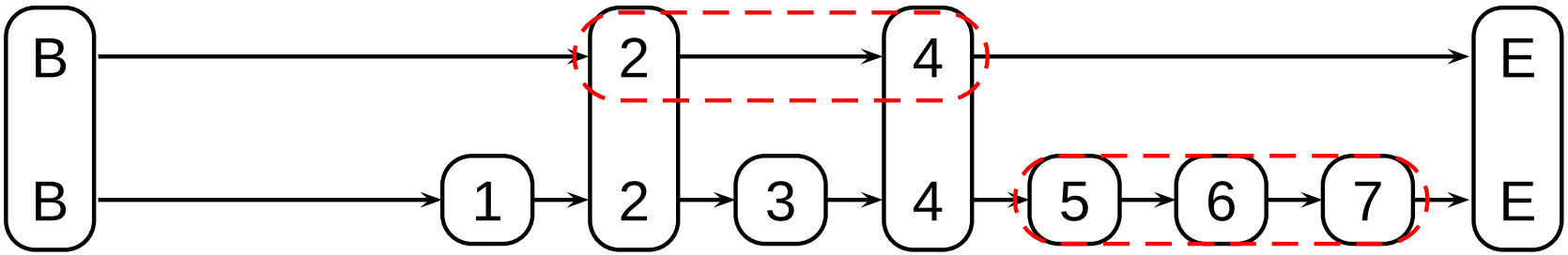


Drzewo czerwono-czarne

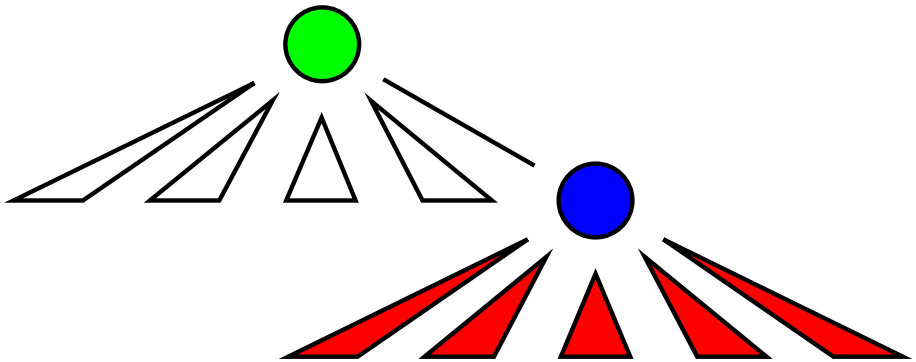


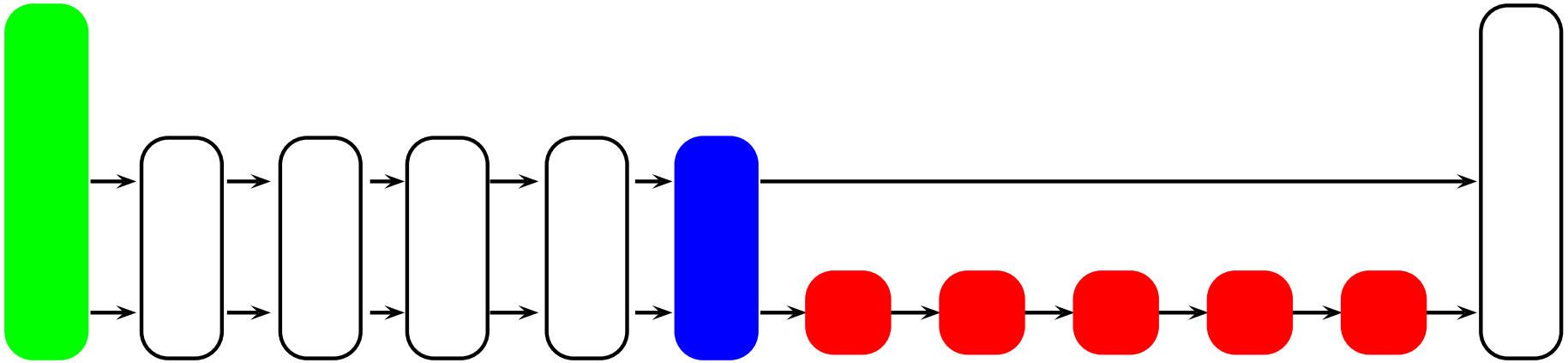
2-3-4 drzewo i 1-2-3 lista.



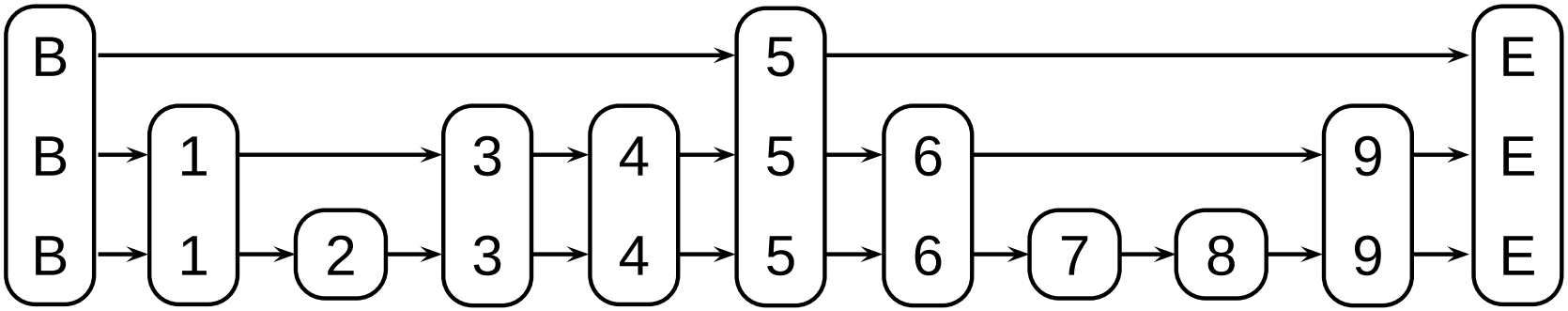


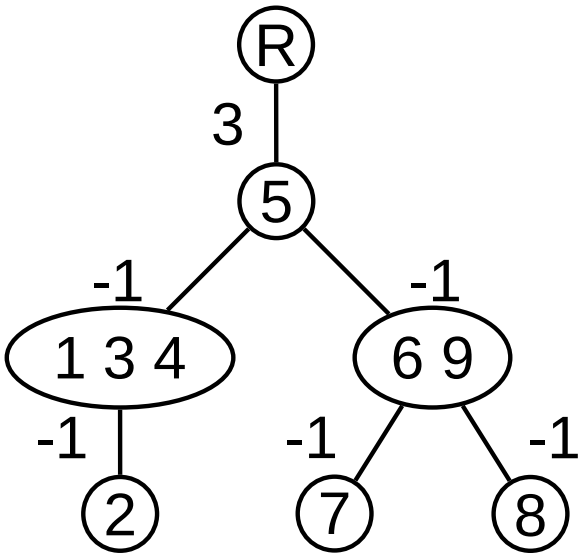
Inne B-drzewa.

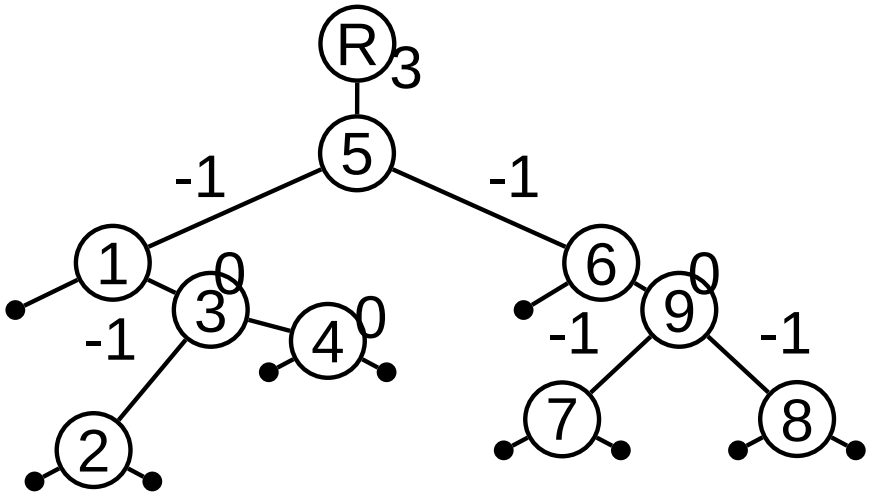


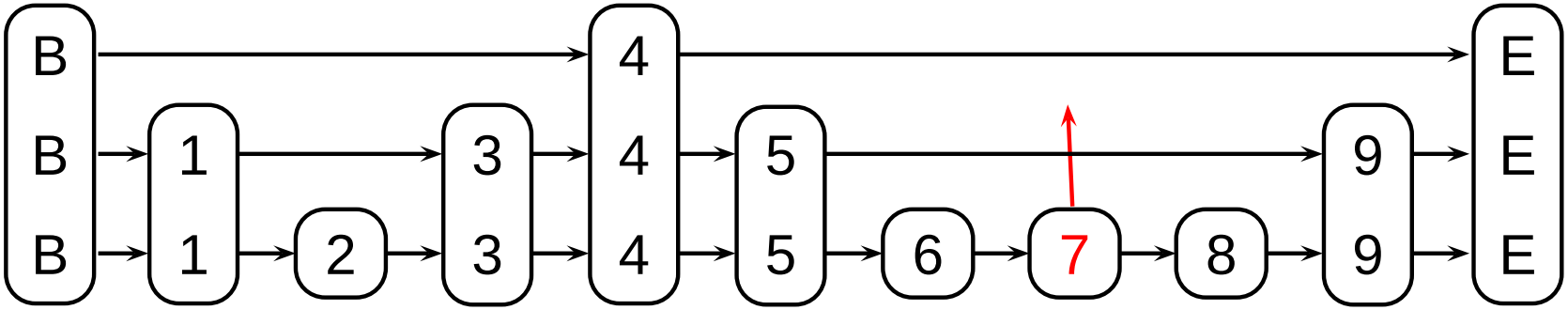


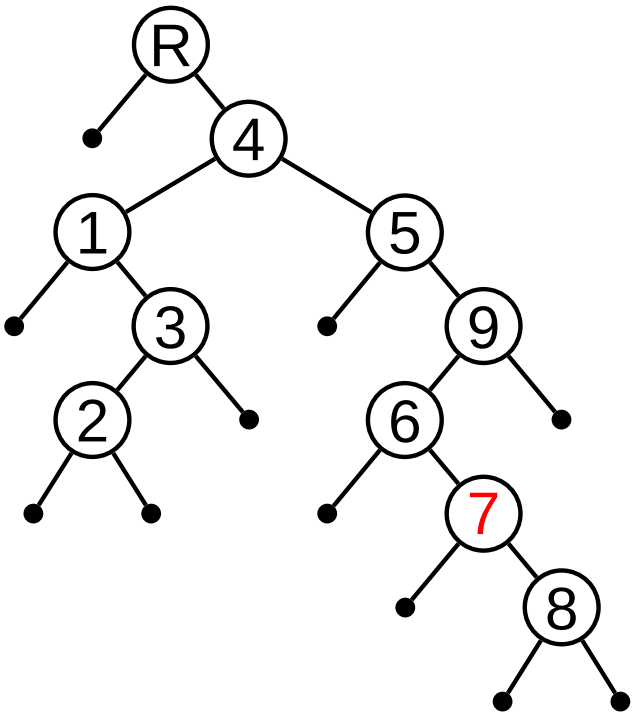
Morfizm do drzewa z wagami krawędzi.

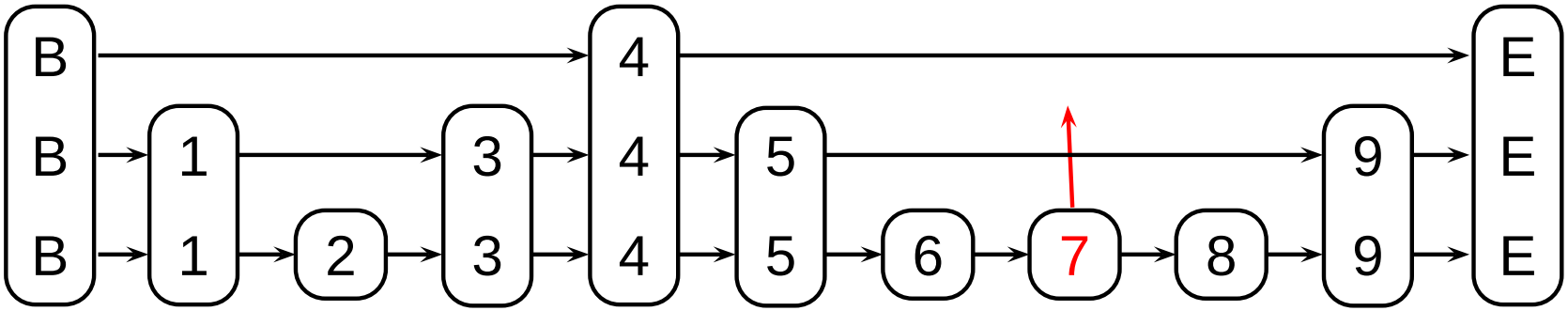


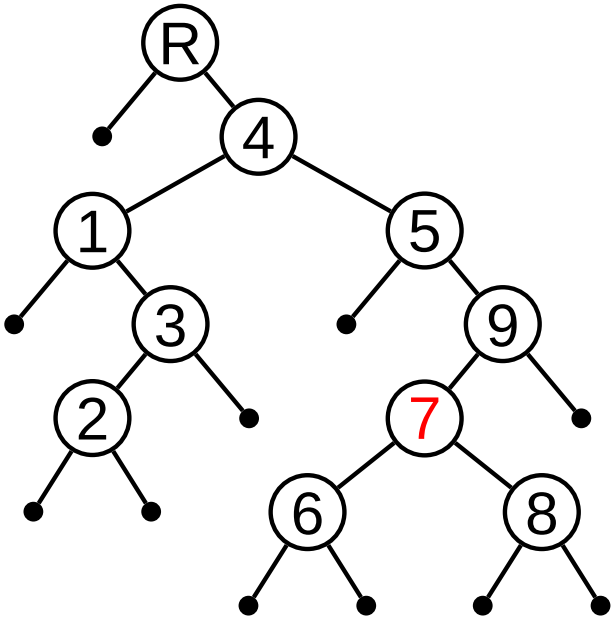


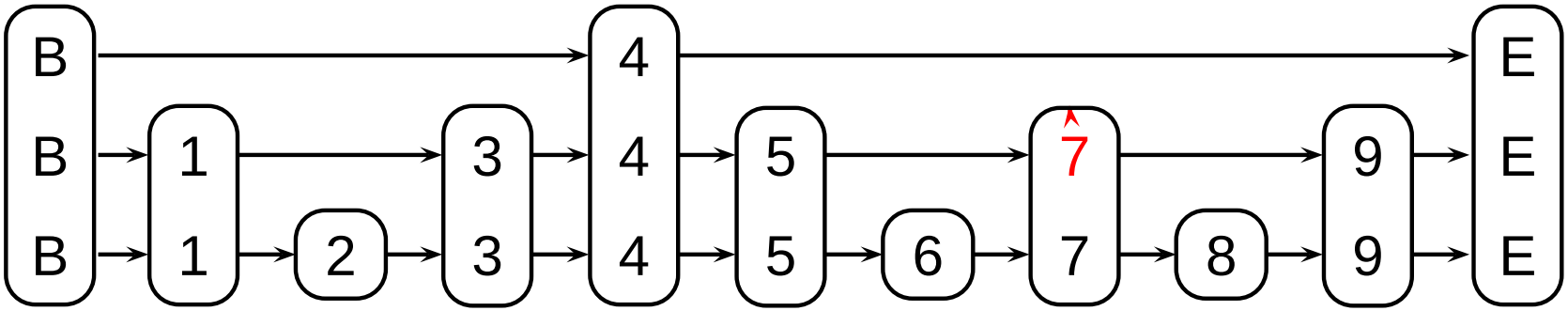


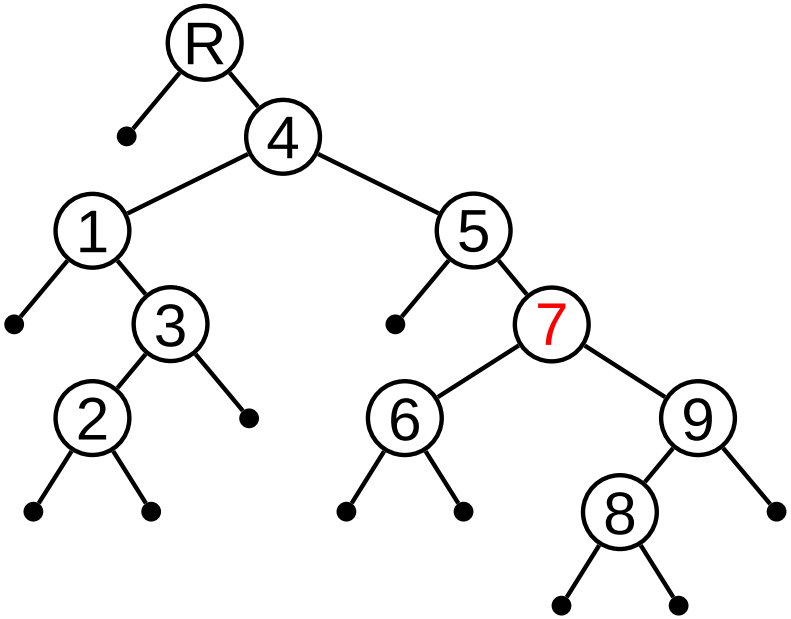

B
B
B
1
1
2
3
3
4
4
4
5
5
6
7
8
9
9
E
E
E

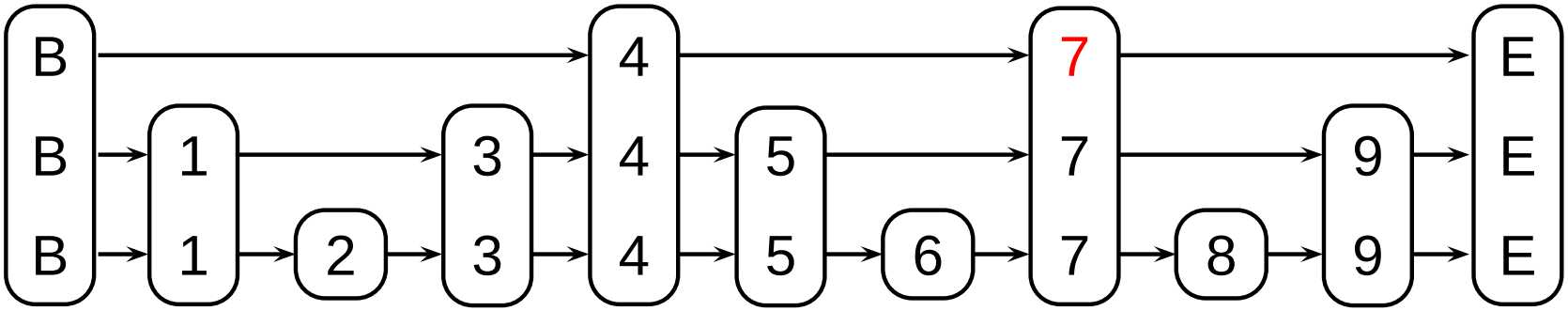

R
4
1
5
3
9
2
6
7
8

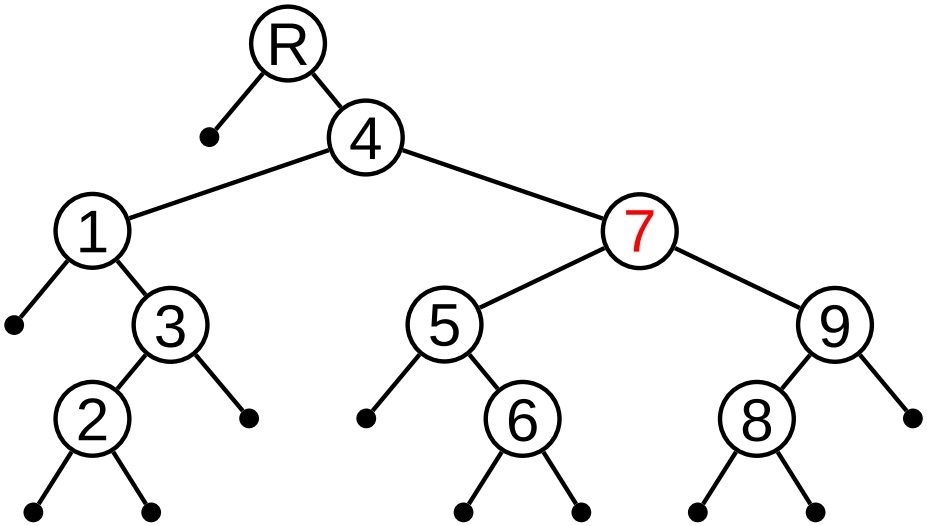

B
B
B
1
1
2
3
3
4
4
4
5
5
6
7
8
9
9
E
E
E


R
4
1
5
3
9
2
7
6
8

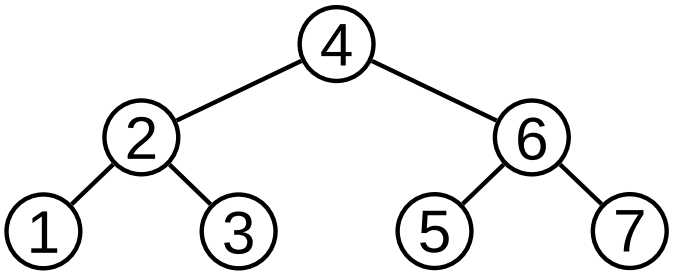

B
B
B
1
1
2
3
3
4
4
4
5
5
6
7
7
8
9
9
E
E
E

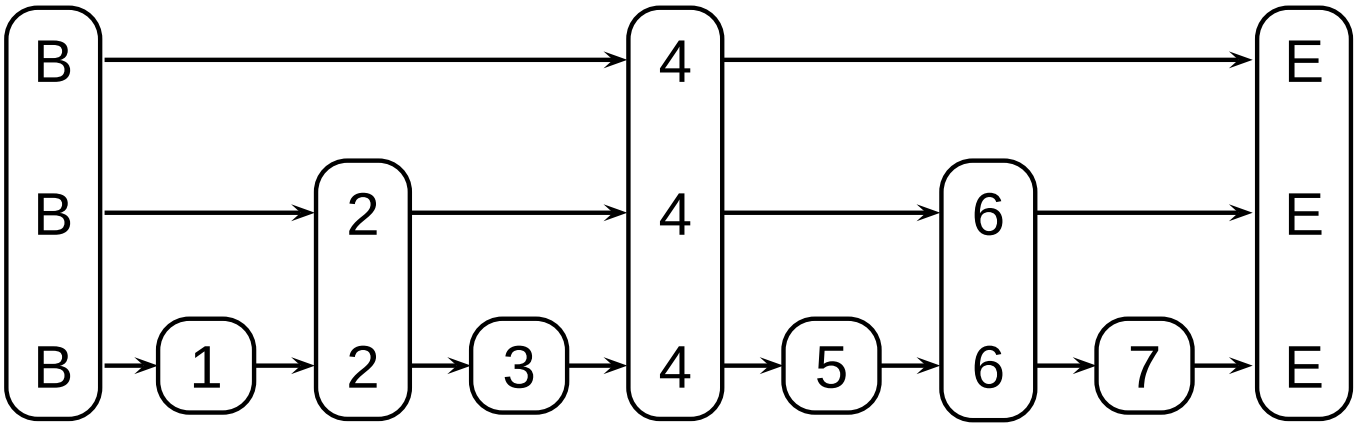

R
4
1
5
3
7
2
6
9
8


B
B
B
1
1
2
3
3
4
4
4
5
5
6
7
7
7
8
9
9
E
E
E

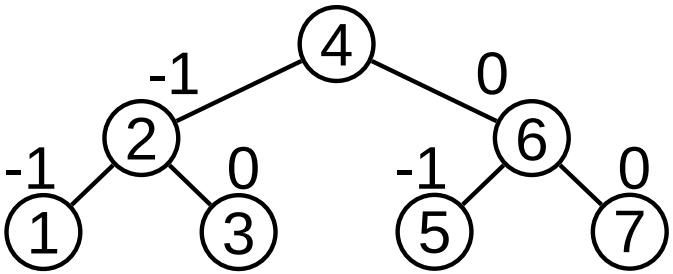

R
4
1
3
2
7
5
6
9
8

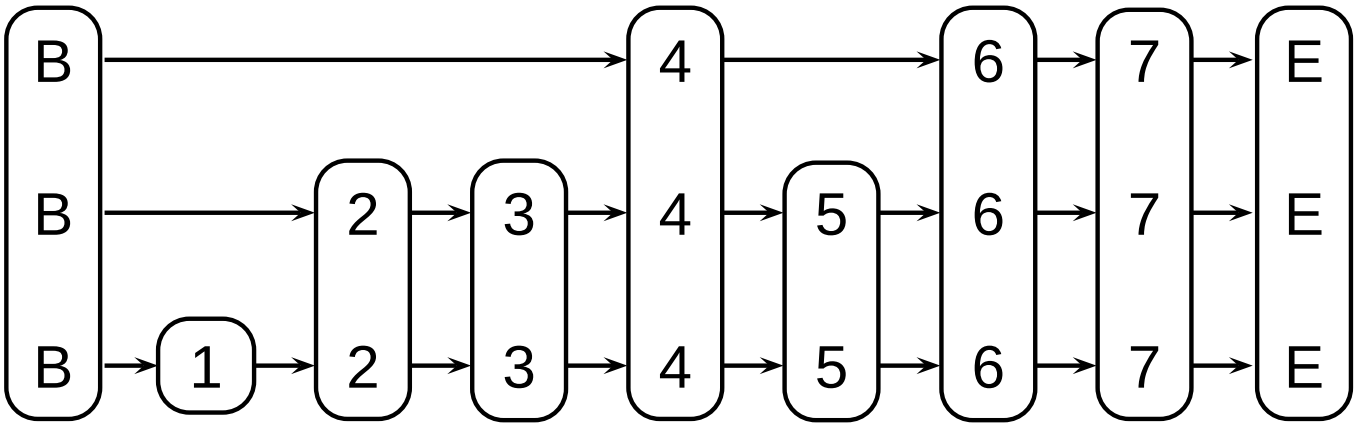
Pierwsze podejście.



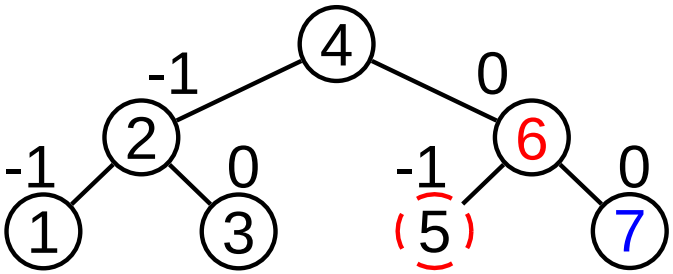


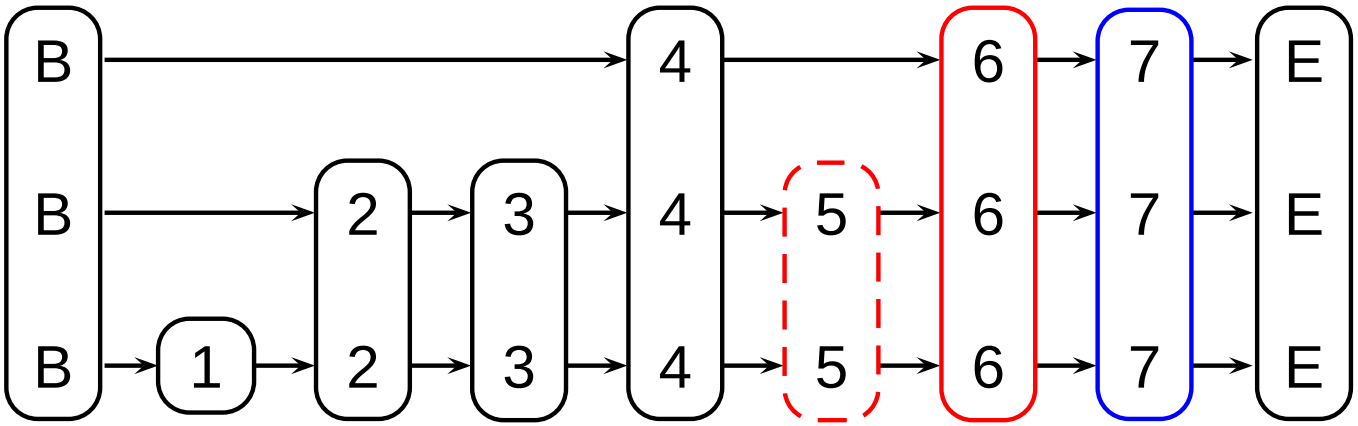
Narzucenie wag: -1 dla lewego syna i 0 dla prawego.



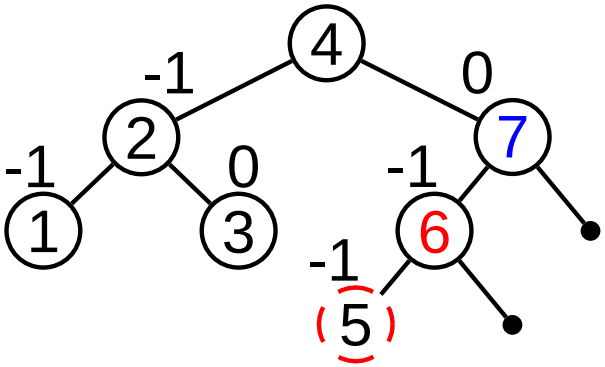


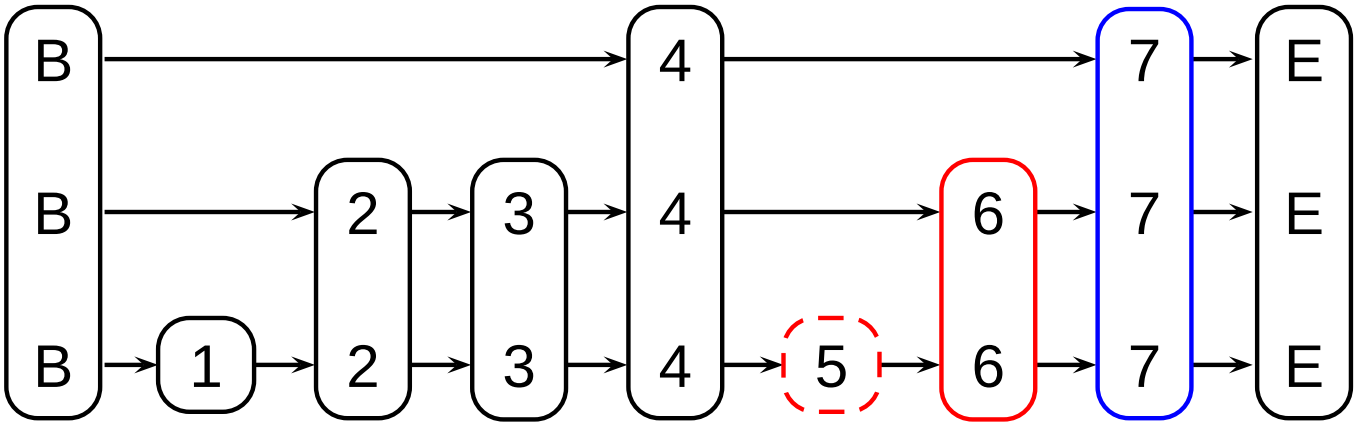
Rotacja w lewo.



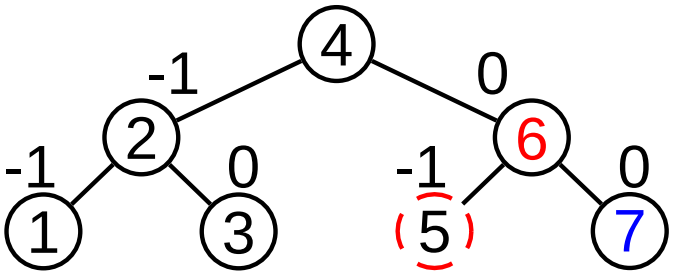


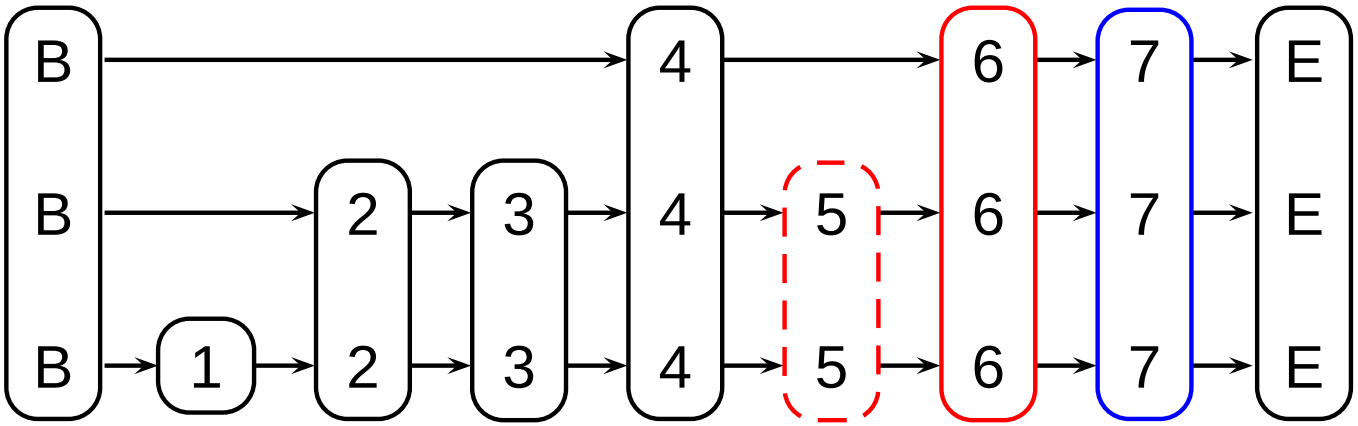
Rotacja w lewo.



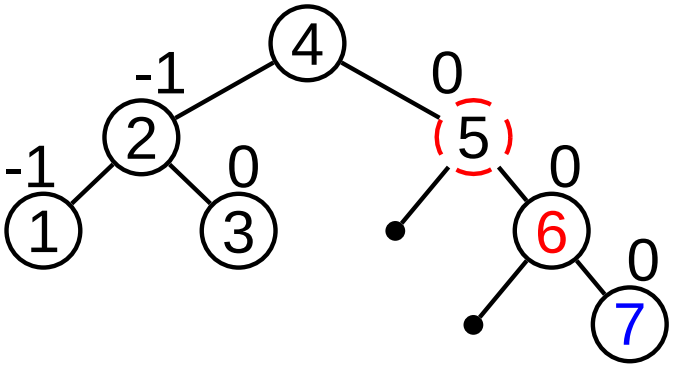


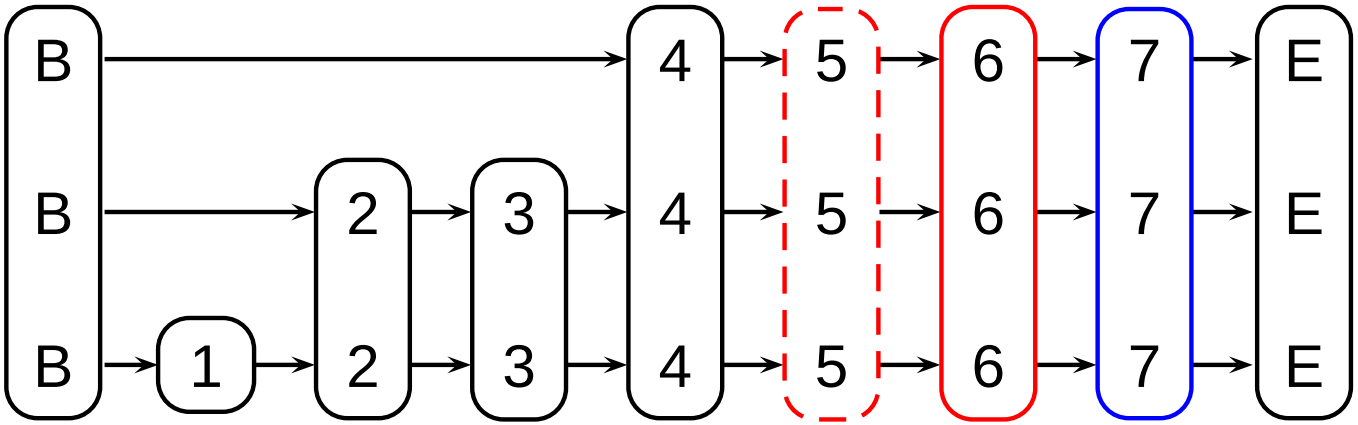
Rotacja w prawo.





Rotacja w prawo.





- J. I. Munro, T. Papadakis and R. Sedgewick. *Deterministic skip lists*. In *Proceedings of the 3rd annual ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 376-375, 1992.
- B. C. Dean and Z. H. Jones. *Exploring the Duality Between Skip Lists and Binary Search Trees*. ACM Southeast Regional Conference 2007, In *Proceedings of the 45th annual southeast regional conference*, pages 395-399, 2007.
- W. Pugh. *Skip lists: A probabilistic alternative to balanced trees*. Communications of the ACM, 33(6):668-676,1990.