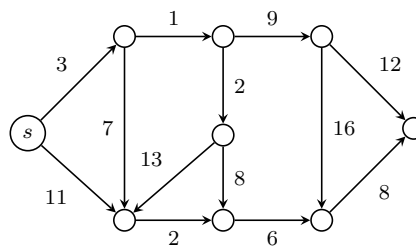


Exercise 5

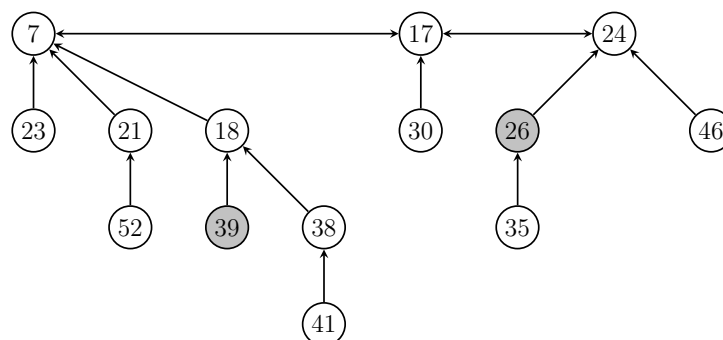
Task 1

Use Dijkstras algorithm to compute all shortest paths starting at node s .



Task 2

Given the following Fibonacci heap:



Perform the following operations:

delete-min, **decrease-key**("52", 9), **decrease-key**("46", 3), **insert**(42), **delete-min**, **decrease-key**("35", 7)

Task 3

Show Theorem 18 from the lecture: For all $k \geq 0$ we have

$$F_k = \frac{1}{\sqrt{5}} \left(\frac{1 + \sqrt{5}}{2} \right)^{k+1} - \frac{1}{\sqrt{5}} \left(\frac{1 - \sqrt{5}}{2} \right)^{k+1}$$

Task 4

Prove or disprove: The height of a Fibonacci heap of size n is at most $O(\log n)$.