C-13.3 Hint: Suppose that such a nontree edge is a cross edge, and argue based upon the order the DFS visits the end vertices of this edge how this leads to a contradiction.

R-15.3 Hint: Review the MST algorithm in question.

Oppgave 3 (Biconnectivity)

Given the graph G of Figure 1.

1. Is the graph biconnected?

   Solution

   No.

2. If not, find the articulation point in G. Show the depth-first search spanning tree. Indicate back edges. You should also indicate the value of $low(v)$ and $index(v)$ for each node v in the graph.

   Solution

   Articulation point: A, G, H, I. The DFS spanning tree is shown in Figure 2. The edges of the DFS spanning tree are shown as solid arrows. Of course, the shown tree corresponds to one particular run of a DFS, starting at A; there are different runs, which also lead to different pre-order numbering (the "visiting times") and consequently to different low-numbers. Independent from the particular run, the articulation points, however, are always the same.

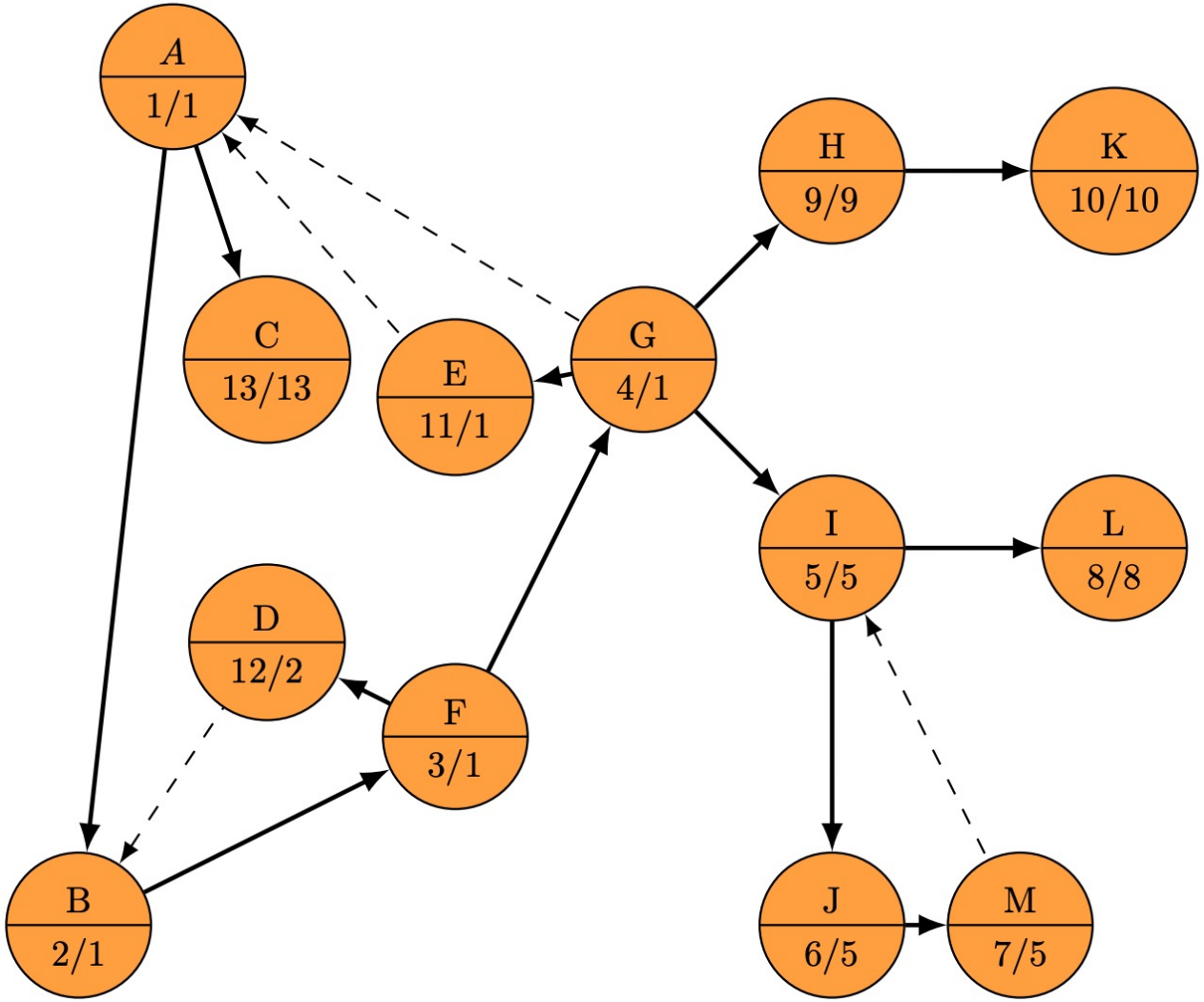


Figure 2: Solution for exercise3

Oppgave 4 (Strongly connected components)

Given the graph G of Figure 3. Compute the strongly connected components of G, by using the algorithm from the lecture.

Solution

$\{A, B, C\}, \{D, H, G, F, J\}, \{E\}, \{I\}, \{N\}, \{OM\}, \{K\}, \{L\},$