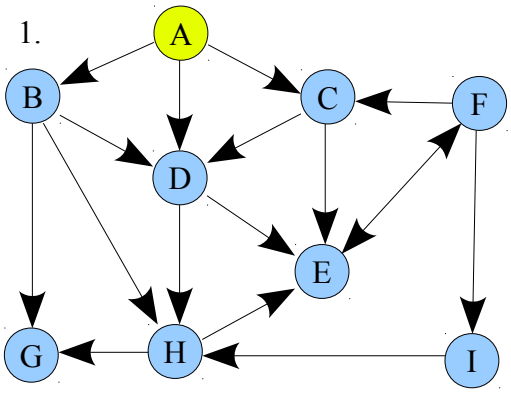
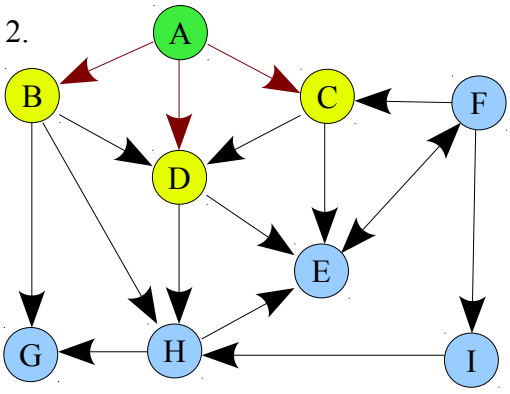
Aufgabe 1

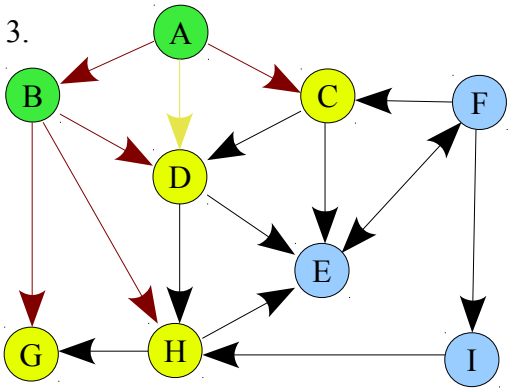
1.



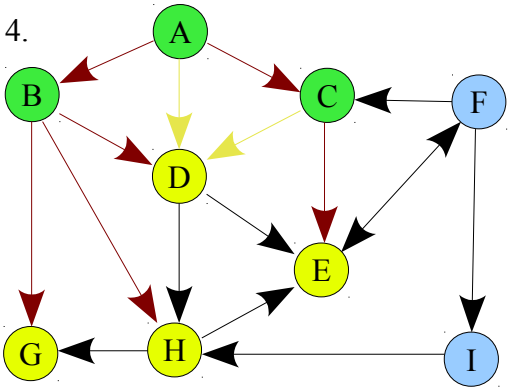
2.



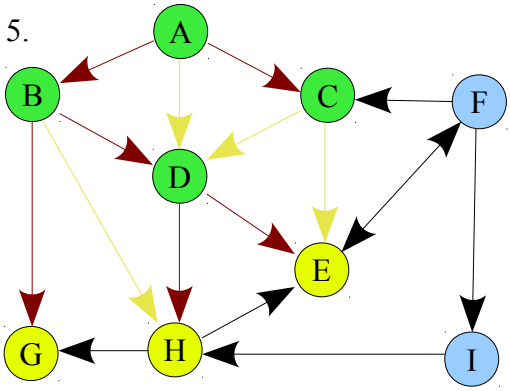
3.



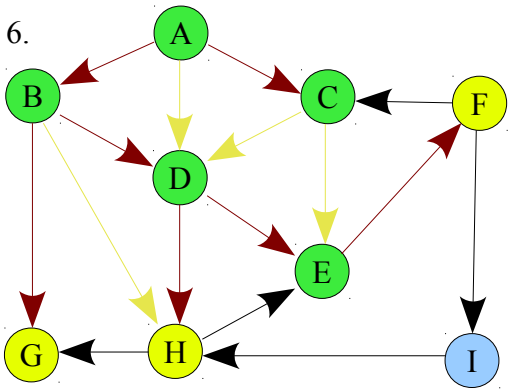
4.



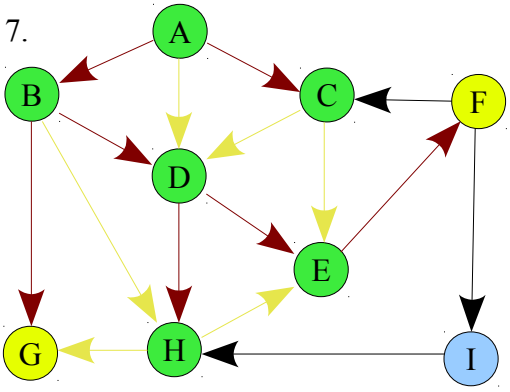
5.



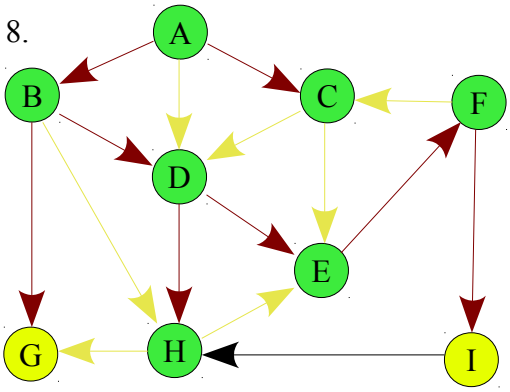
6.



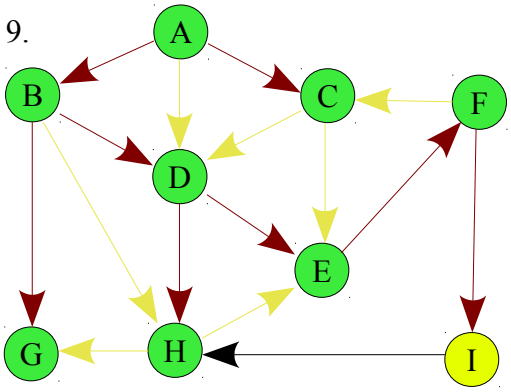
7.



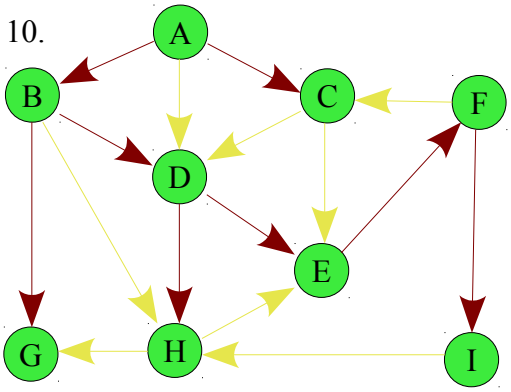
8.



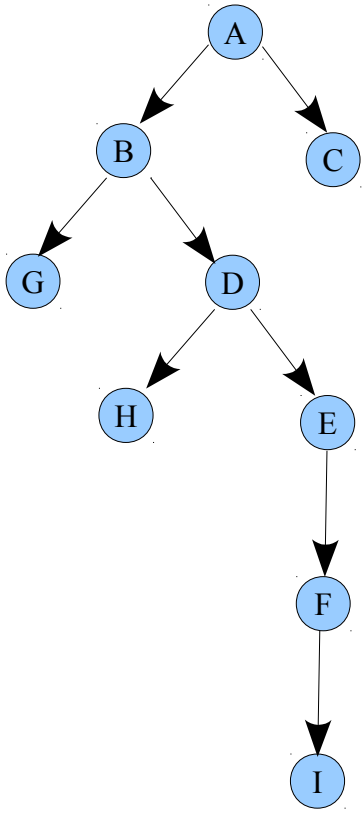
9.



10.

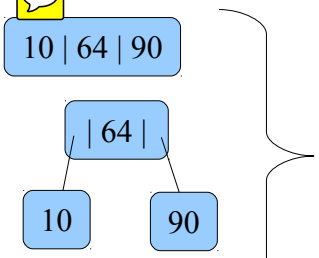


Damit hat der Baum der kürzesten Wege folgendes aussehen:

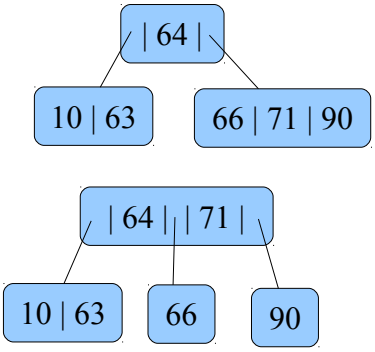


Aufgabe 2

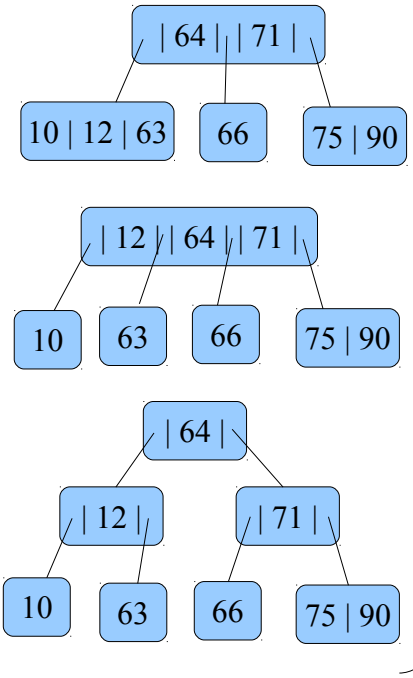
(a)



overflow, da max. 2m == 2 Schlüssel in einem Knoten enthalten sein dürfen.
==> split in 3 Knoten

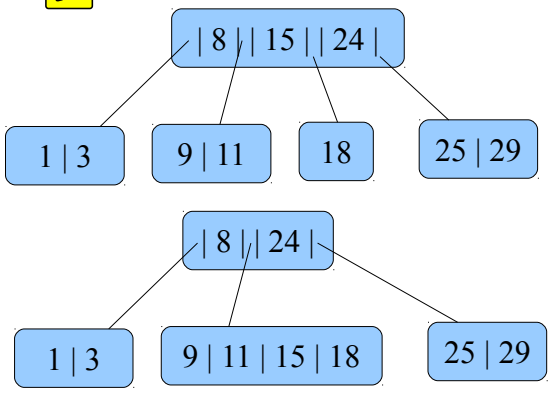


Overflow des rechten Blattes.
==> split in 2 Knoten und link über mittlerem Schlüssel

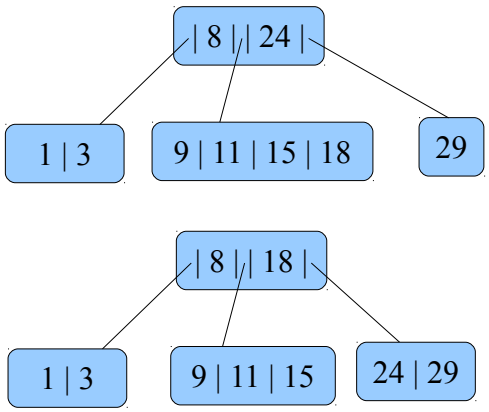


Overflow des linken Blattes.
==> split in 2 Knoten und link über mittlerem Schlüssel im Vaterknoten
==> dieser hat auch overflow und wird gesplittet: mittlerer Schlüssel wird neue Wurzel

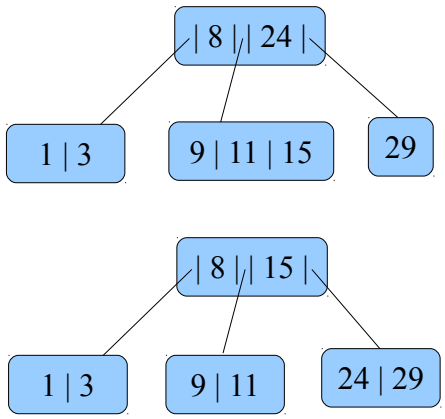
(b)



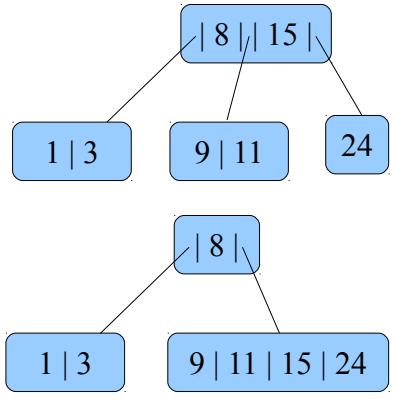
Underflow nach löschen von 14, da min. m == 2 Schlüssel in einem Blatt enthalten sein dürfen.
==> merge der beiden mittleren Blätter



Underflow nach löschen von 25.
==> balance der beiden rechten Blätter



Underflow nach löschen von 18.
==> balance der beiden rechten Blätter



Underflow nach löschen von 29.
==> merge der beiden rechten Blätter