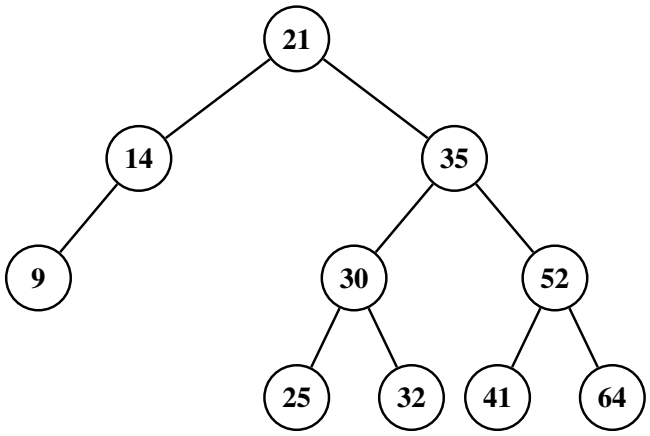
5. (14 pts) AVL Trees



(a) What is the balance for the following nodes in the AVL tree: **14**, **21**, **35**, and **41**?

(b) Show the AVL tree after inserting **3** into the provided tree.

(c) Show the AVL tree after inserting **36** into your answer from (b).

(d) Show the AVL tree after inserting **70** into your answer from (c).

(e) Show the AVL tree after deleting **52** from your answer from (d). Your deletion should use the immediate predecessor for replacement.

(f) Show the AVL tree after deleting **36** from your answer from (e). Your deletion should use the immediate predecessor for replacement.

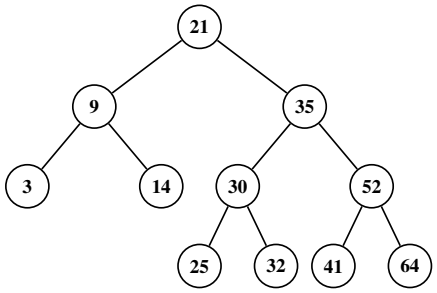
Solution

(a) Balances are as follows using the formula: height(*left child*) − height(*right child*)

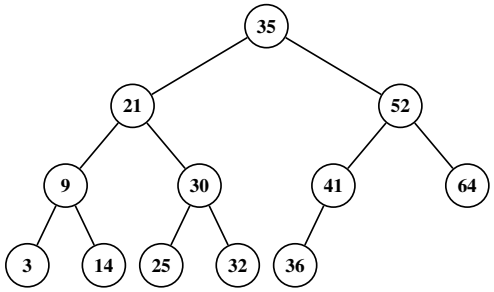
balance(14) = 0 − (-1) = 1 balance(35) = 2 − 2 = 0

balance(21) = 1 − 2 = -1 balance(41) = (-1) − (-1) = 0

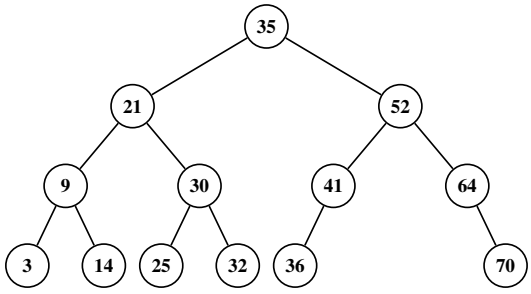
(b)



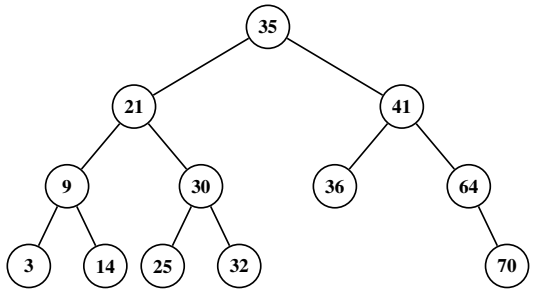
(c)



(d)



(e)



(f)