Sabancı University
Faculty of Engineering and Natural Sciences

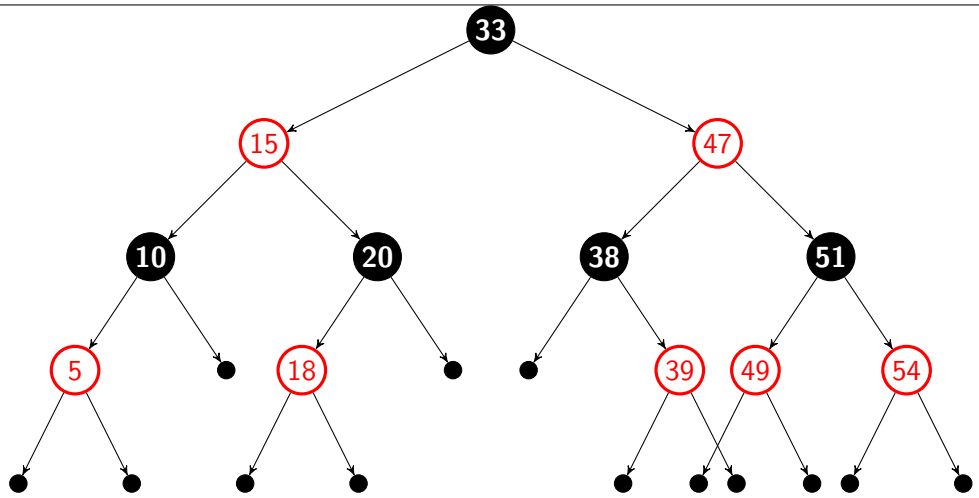
CS301 – Algorithms

Homework 3

Due: November 17, 2020 @ 23.59
(Upload to SUCourse+ - **no late submission**)

PLEASE NOTE:

- Provide only the requested information and nothing more. Unreadable, unintelligible and irrelevant answers will not be considered.
- You can collaborate with your `TA/INSTRUCTOR ONLY` and discuss the solutions of the problems. However you have to write down the solutions on your own.
- Plagiarism will not be tolerated.
- Submit your answers as a single pdf file named as username-yourname-surname-hw2.pdf
- Example submission file name: furkanreha-furkanreha-tutas-hw2.pdf
- Late submission is allowed for only 10 hours. Each hour late submission costs 10% of your grade. For example, if you submit 2 hours late, your grade will be multiplied by 0.8.



1. Consider the above red-black tree, insert the following numbers to the red-black tree independently. Show your work step by step for each insertion.
   (a) Insert 3.
   (b) Insert 19.
   (c) Insert 56.

2. Suppose that there are n items to be transferred from a warehouse A to another warehouse B. Each item i to be transferred has the weight of w_i and the value of v_i, $1 \leq i \leq n$. We will be paid 0.1% of the total value of the load that we transfer by our truck which can carry at most W tons, and we are allowed to make only one trip from warehouse A to warehouse B.
   (a) Suggest an efficient dynamic programming algorithm to decide which items we should carry so that we make the most money.
   (b) What is the complexity of your algorithm?
   (c) By creating dynamic programming table for the following items and their value find best solution for transporting items. (Assume W is 5 tons)

Item	Weight	Value
1	2	12
2	1	10
3	3	20
4	2	15