3) (10 pts) ALG (Tries and AVL Trees)

(a) (5 pts) (Tries) Suppose we insert the following strings into an initially empty trie:

`cat` `cap` `catapult` `catalyst` `phosphorescent` `pancake` `pancakes`

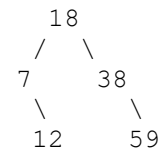
How many nodes will the resulting trie contain? Please count carefully, as credit for this question may be all or nothing

Count the root node, and then below each letter that is the first time that node is created will be underlined:

root	→	1
cat	→	3
cap	→	1
catapult	→	5
catalyst	→	4
phosphorescent	→	14
pancake	→	6
pancakes	→	1
		35

Grading
5 pts for a correct answer, 4 for answering 34, 3 for answering 36, 2 pts (30 – 40),
1 pt – (20 – 50), 0 pts - otherwise

(b) (5 pts) Show what the following AVL would look like after inserting the value 42 and performing any necessary rotations.



Grading: 5 pts for correct answer,
4 pts if just one node (such as 12) is missing but rebalance was correct,
0 pts otherwise

Computer Science Foundation Exam

January 14, 2023

Section C

ALGORITHM ANALYSIS

NO books, notes, or calculators may be used,
and you must work entirely on your own.

SOLUTION

Question #	Max Pts	Category	Score
1	5	ANL	
2	10	ANL	
3	10	ANL	
TOTAL	25		

You must do all 3 problems in this section of the exam.

Problems will be graded based on the completeness of the solution steps and not graded based on the answer alone. Credit cannot be given unless all work is shown and is readable. Be complete, yet concise, and above all be neat. For each coding question, assume that all of the necessary includes (stdlib.h, stdio.h, math.h, string.h) for that particular question have been made.