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COMP 311
April 2, 2019
Homework 10

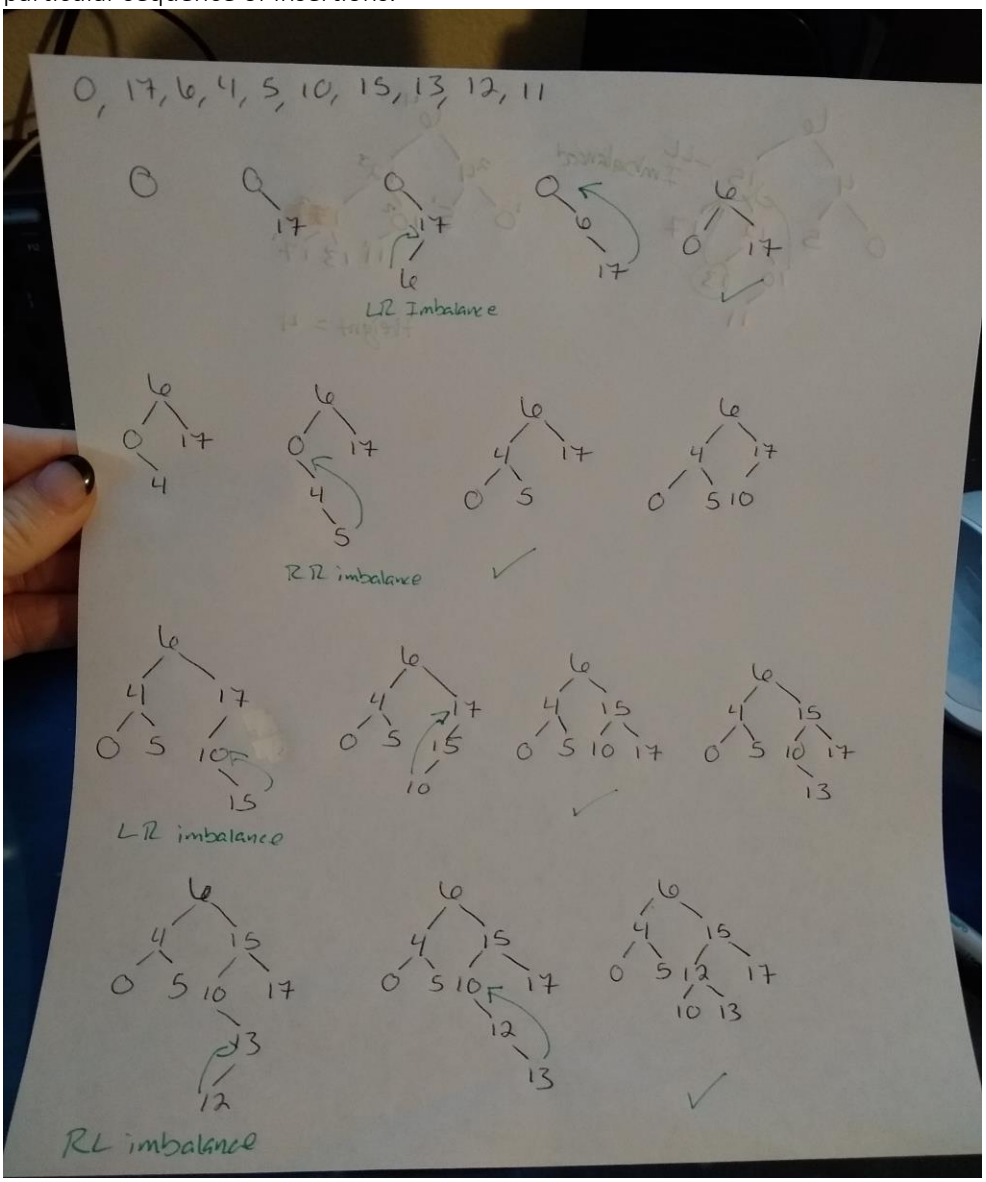
Problem 1 [4 points]

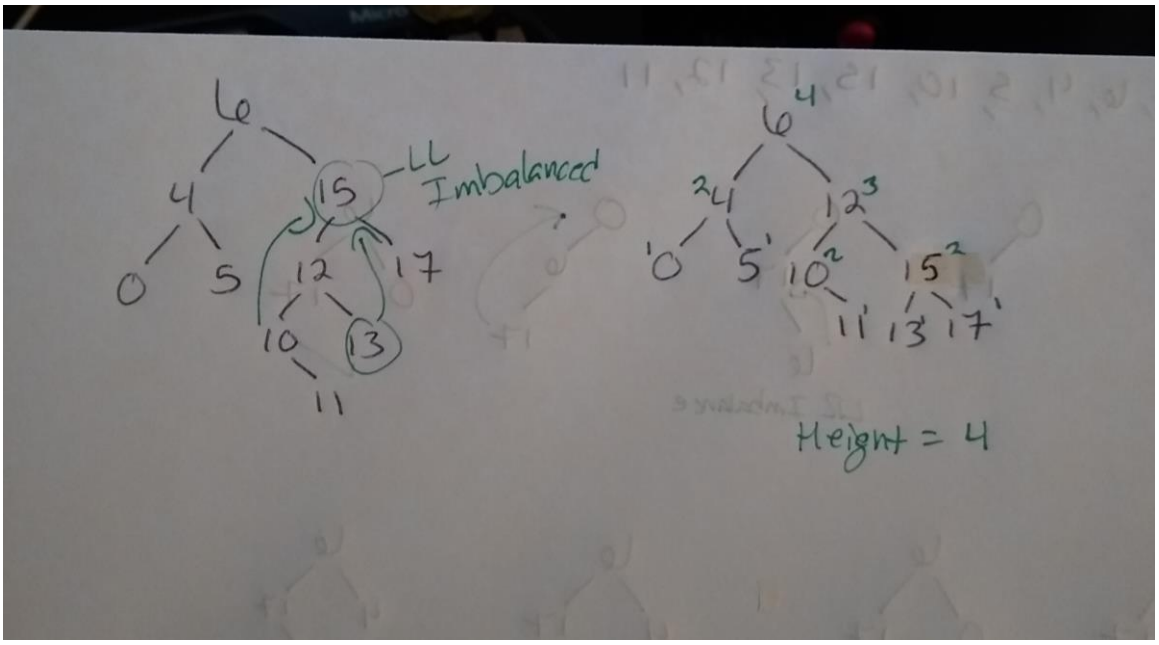
Consider an AVL tree whose root has a height of 5. What is the maximum difference between the depths of **any two leaves** in this tree. Briefly justify your answer.

If the difference between any two leaves is greater than 1, it isn't a balanced AVL tree. It needs to be rotated to fit the structure of an AVL tree.

Problem 2 [8 points]

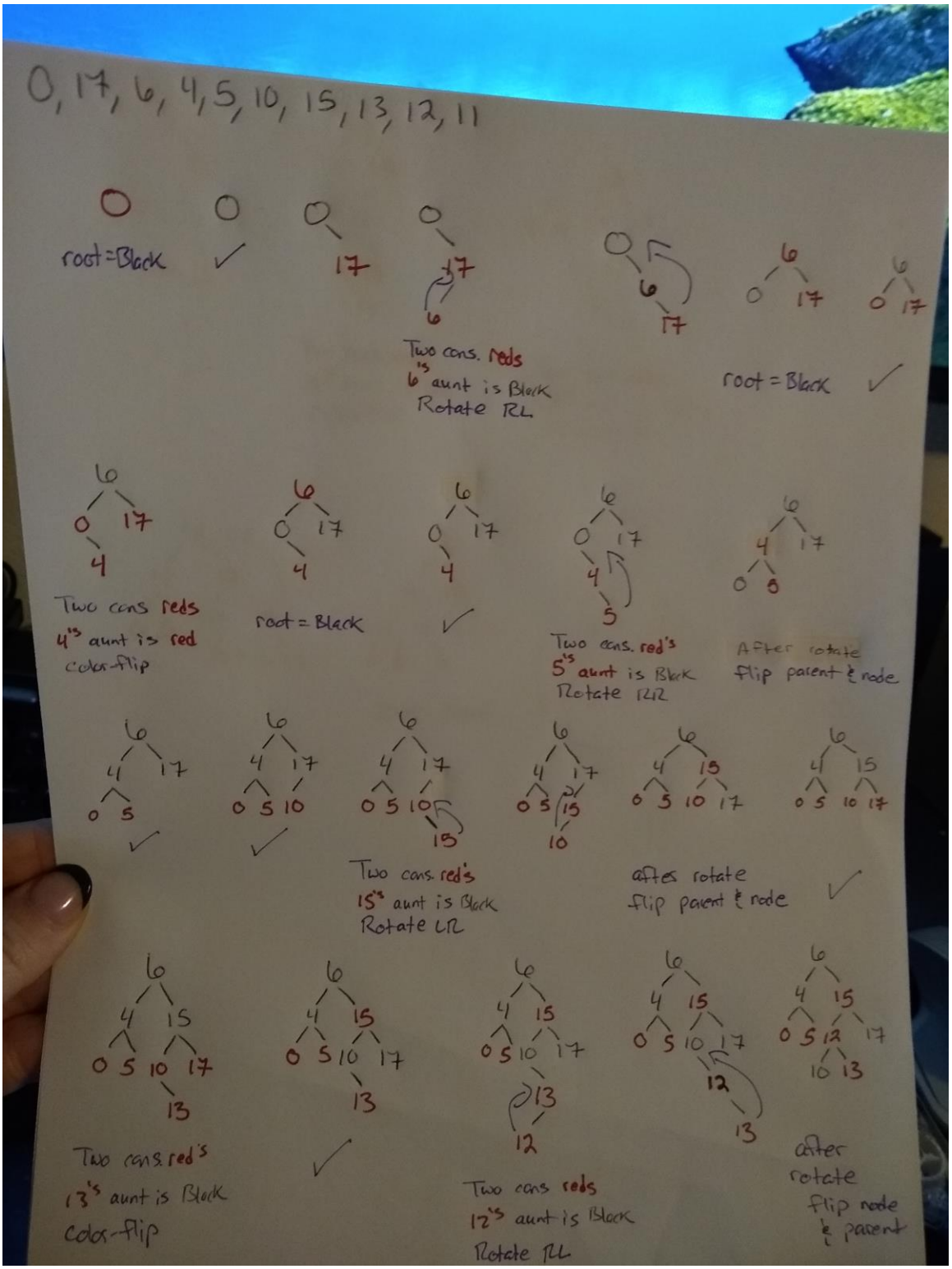
Starting with an empty AVL tree, insert the following keys in the order given: 0, 17, 6, 4, 5, 10, 15, 13, 12, 11. Show the AVL tree after each insertion. If the insertion requires a rotation operation to restore the balance, clearly indicate the specific type of rotation required. Show the result after the rotation operation required has been applied. After you have finished inserting all ten elements, you are required to give the height of the final AVL tree that resulted from this particular sequence of insertions.

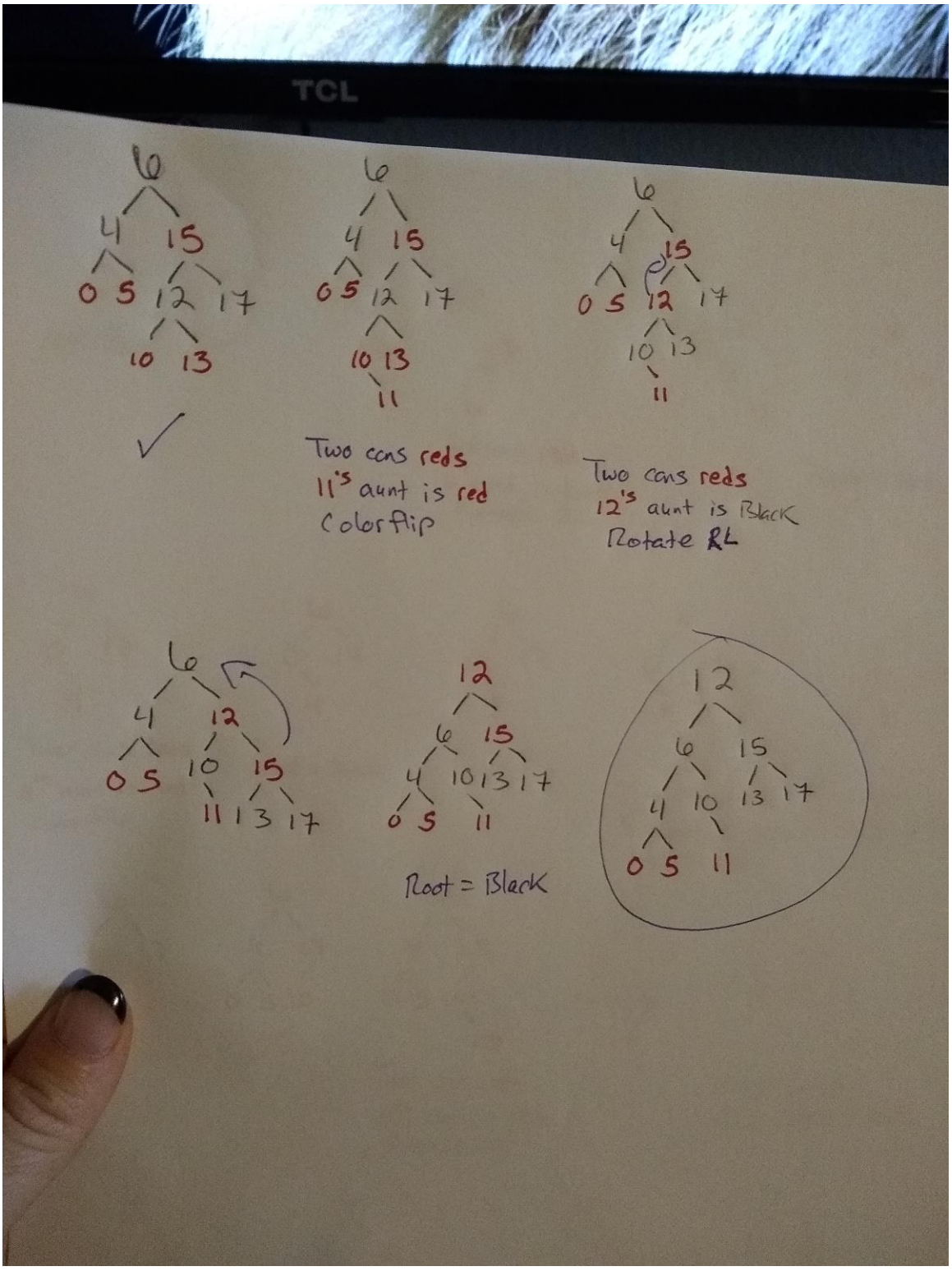



6
4
15
LL
Imbalanced
0
5
12
17
10
13
11
6
4
4
2
12
3
0
1
5
1
10
2
15
2
1
1
3
1
7
1
Height = 4

Problem 3 [8 points]

Perform the same steps as in the last problem, but use a Red-Black tree instead.




TCL
6
4 15
0 5 12 17
10 13
✓
6
4 15
0 5 12 17
10 13
11
Two cons reds
11's aunt is red
Colorflip
6
4 15
0 5 12 17
10 13
11
Two cons reds
12's aunt is Black
Rotate RL
6
4 12
0 5 10 15
11 13 17
12
6 15
4 10 13 17
0 5 11
Root = Black
12
6 15
4 10 13 17
0 5 11

Reflection [5 points]

In two to three paragraphs of prose (i.e. sentences, not bullet lists) using APA style citations if needed, summarize and interact with the content that was covered in the class "Meet" session (or face-to-face class) this week. In your summary, you should highlight the major topics, theories, practices, and knowledge that were covered. Your summary should also interact with the material through personal observations, reflections, and applications to the field of study. In particular, highlight what surprised, enlightened, or otherwise engaged you. Make sure to include at least one thing that you're still confused about. In other words, you should think and write critically not just about what was presented but also what you have learned through the session. Feel free to ask questions in this as well since it will be returned to you with answers.

Learning about AVL and red/black trees was really interesting this week. I'm kind of hoping that the last lab will build off of these. Would be interesting to see how these are used in actual programming.