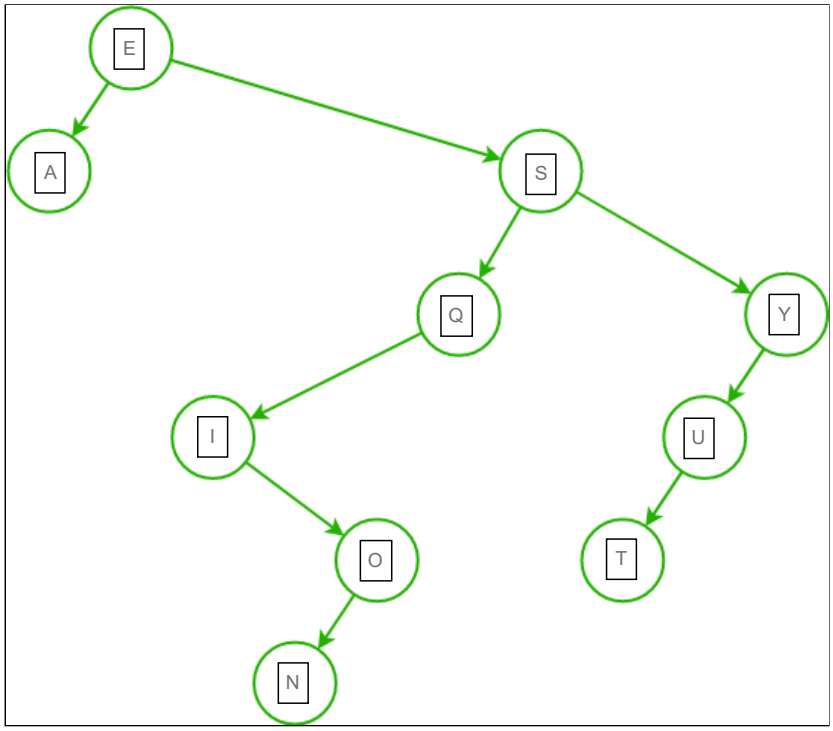
Started on	Wednesday, 19 April 2023, 10:04
State	Finished
Completed on	Wednesday, 19 April 2023, 11:20
Time taken	1 hour 15 mins
Marks	13.74/14.00
Grade	9.81 out of 10.00 (98%)

Question 1

Correct

Mark 1.00 out of 1.00

Draw the BST resulting from inserting the keys:
E A S Y Q U E S T I O N



Your answer is correct.

Question 2

Correct

Mark 1.00 out of 1.00

What depth will the BST resulting from inserting the following keys have?

A X C S E R H

Select one:

- a. 1
- b. 7
- c. 6 ✓
- d. 8

Your answer is correct.

The correct answer is: 6

Question 3

Correct

Mark 1.00 out of 1.00

The before-mentioned BST is a worst-case BST (having the largest possible height) because of the order which the keys are inserted.

Using the same keys as before, which of the following orders will also produce a worst-case BST

Select one or more:

- a. X A S C R H E ✓
- b. X S R H E C A ✓
- c. A C E H R S X ✓
- d. X A S C R E H ✓
- e. S A X C R H E

Your answer is correct.

The correct answers are: A C E H R S X, X S R H E C A, X A S C R E H, X A S C R H E

Question 4

Correct

Mark 1.00 out of 1.00

Say you want to produce a best-case BST (having the smallest possible height) from the keys: A X C S E R H

Which key will you need to insert first:

Select one:

- Doesn't matter
- A
- X
- C
- S
- E
- R
- H ✓

Your answer is correct.

The correct answer is: H

Question 5

Correct

Mark 1.00 out of 1.00

Say you want to produce a best-case BST (having the smallest possible height) from the keys: A X C S E R H
You have inserted the first key correctly in order to obtain a best-case BST.

Which key will you need to insert next?

Select one or more:

- [ ] Doesn't matter
- [ ] A
- [ ] X
- [x] C ✓
- [x] S ✓
- [ ] E
- [ ] R
- [ ] H

Your answer is correct.

The correct answers are: C, S

Question 6

Correct

Mark 1.00 out of 1.00

Suppose that a certain BST has keys that are integers between 1 and 10, and we search for 5.
Which sequence below *cannot* be the sequence of keys examined?

Select one:

- (•) a. 2, 7, 3, 8, 4, 5 ✓
- ( ) b. 10, 9, 8, 7, 6, 5
- ( ) c. 1, 10, 2, 9, 3, 8, 4, 7, 6, 5
- ( ) d. 1, 2, 10, 4, 8, 5
- ( ) e. 4, 10, 8, 6, 5

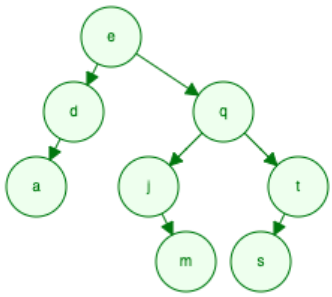
Your answer is correct.

The correct answer is: 2, 7, 3, 8, 4, 5

Question 7

Correct

Mark 1.00 out of 1.00



Give the sequence of nodes examined when the methods in BST are used to compute each of the following quantities for the above tree:

ceiling("q")	e q	✓
rank("j")	e q j	✓
select(5)	e q	✓
floor("q")	e q	✓
size("d","t")	e q t e d	✓
keys("d","t")	e d q j m t s	✓

Your answer is correct.

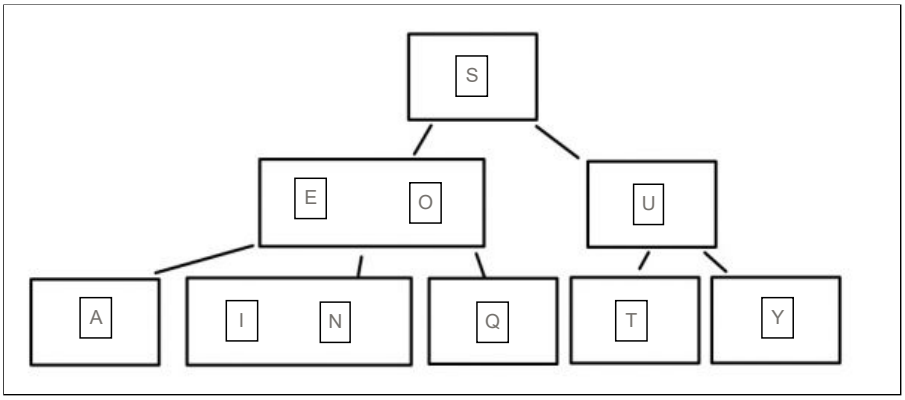
The correct answer is: ceiling("q") → e q, rank("j") → e q j, select(5) → e q, floor("q") → e q, size("d","t") → e q t e d, keys("d","t") → e d q j m t s

Question 8

Correct

Mark 1.00 out of 1.00

"Draw" the 2-3 Tree that results when you insert the keys: E A S Y Q U T I O N in that order into an initially empty tree

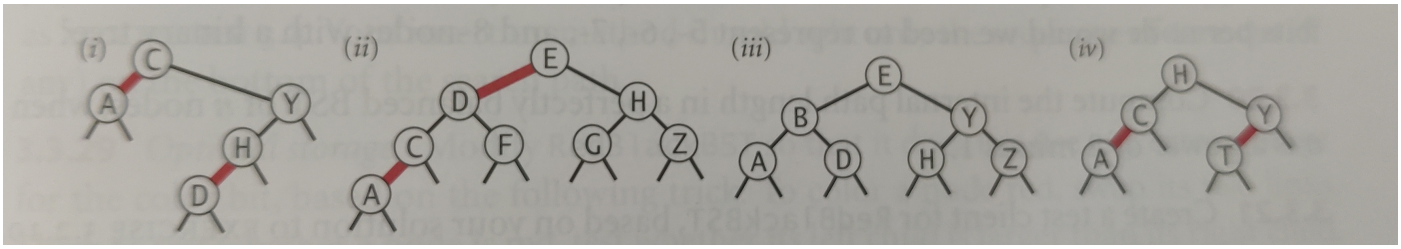


Your answer is correct.

Question 9

Correct

Mark 1.00 out of 1.00



(SW 3.3.9) Which of the four trees are red-black BSTs?

Select one or more:

- [ ] i
- [ ] ii
- [x] iii ✓
- [x] iv ✓

Your answer is correct.

The correct answers are: iii, iv

Question 10

Correct

Mark 1.00 out of 1.00

(SW 3.3.13)
True or false:

If you insert keys in increasing order into a red-black BST, the tree height is monotonically increasing.

Select one:

- True ✓
- False

Monotonic-increasing meaning:

Always increasing or remaining constant, and never decreasing; contrast this with strictly increasing.

The correct answer is 'True'.

Question 11

Correct

Mark 1.00 out of 1.00

With which sequence of keys, if any, will the height of a BST be less than the height of a red-black BST?

Select one:

- a. 2 6 11 16 7 1
- b. Impossible!
  (No, the letters are not keys - we mean: "What you ask is not possible")
- c. 6 2 11 16 7 1 ✓

Your answer is correct.

The correct answer is: 6 2 11 16 7 1

Question 12

Correct

Mark 1.00 out of 1.00

What is true about the height h (including both red and black edges) of a left leaning red black tree with n keys

- [ ] a. $h \leq 2 + \log_3 n$
- [x] b. $h \leq 2 + 2\log_2 n$ ✓
- [x] c. $h \geq \log_2 n$ ✓
- [ ] d. $h \leq 2 + 2\log_3 n$

Your answer is correct.

The correct answers are: $h \geq \log_2 n$, $h \leq 2 + 2\log_2 n$

Question 13

Correct

Mark 1.00 out of 1.00

What is the tightest bound on the number of comparisons of a single search in a 2-3 Tree of height h?

- a. $3h$
- b. $\log h$
- c. $2h$ ✓
- d. h

Your answer is correct.

The correct answer is: $2h$

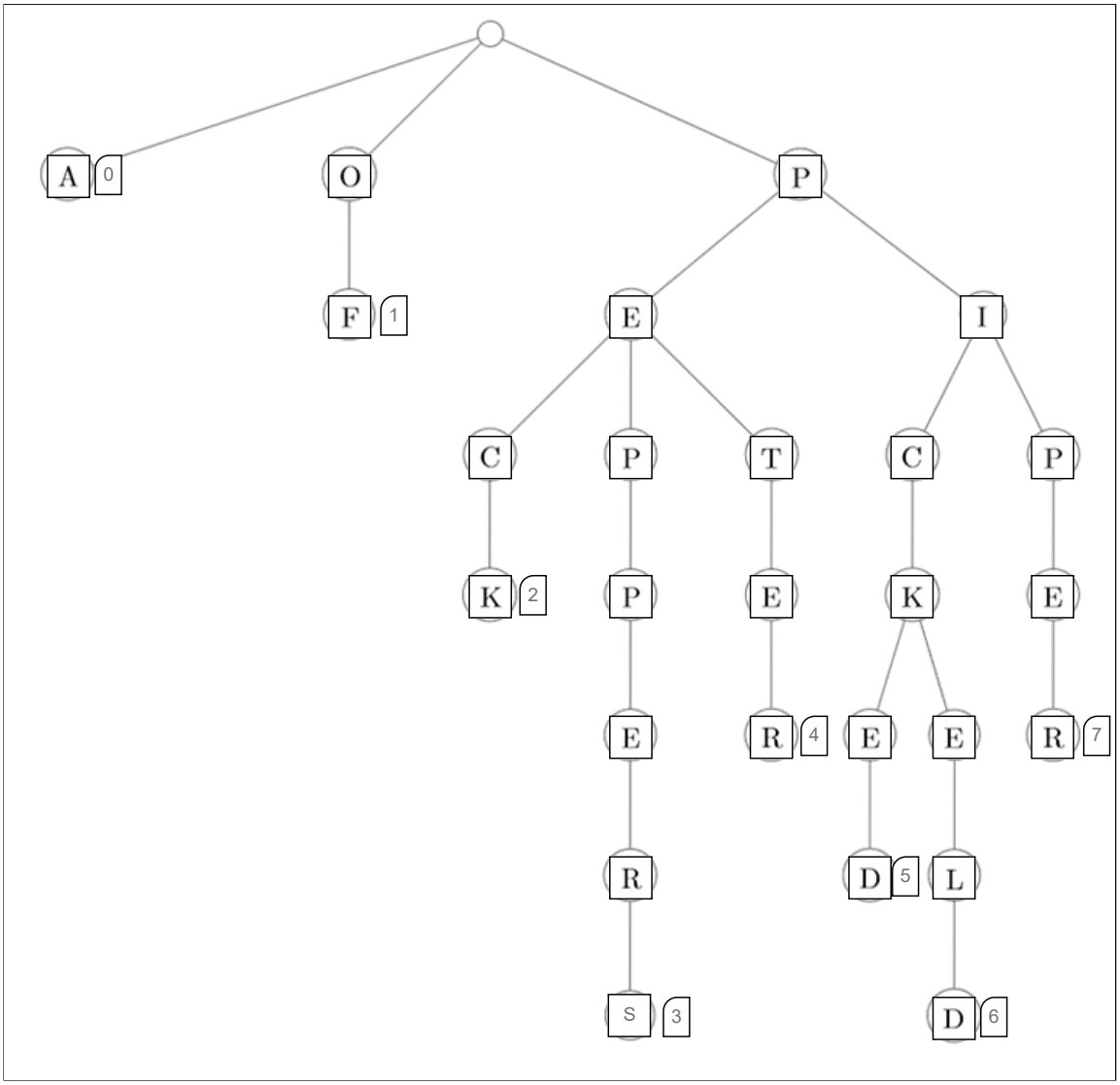
Question 14

Partially correct

Mark 0.74 out of 1.00

Construct the trie for the following tongue twister:

Peter Piper picked a peck of pickled peppers.



A C D E F I K L O P R T

Your answer is partially correct.

You have correctly selected 25.