CSC 370

Quiz:
Query Evaluation and Storage

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Questions

1. (1 point) You have a RAID 5 scheme in place with 3 disks in which Disk 0 is the parity disk for the first third of the data, Disk 1 is the parity disk for the middle third, and Disk 2 is the parity disk for the last third. You lose Disk 1. All disks are 9 bits long. What is the correct way to restore the data?

   ◯ Calculate Disk0 ⊕ Disk2.

   ◯ Neither. Disk 2 must be restored from a snapshot in an archive (tertiary storage).

   ◯ Calculate (Disk0 AND 111111000) ⊕ (Disk2 AND 000111111).

2. (1 point) You have two tables, R and S, which each have sixteen tuples that are 16B long. You also have a block size of 64B and 256B of available memory. Excluding output, how many I/O's does a block-nested loops join algorithm require to join R and S?

   ◯ 8

   ◯ 12

   ◯ 20

   ◯ 68

3. (1 point) You are given the SQL query below. What is the smallest possible number of nodes that a correct logical query plan could have?

```
SELECT *
FROM (
        SELECT R.x, S.y
        FROM R
            NATURAL JOIN S
        WHERE S.y < 20
    ) AS A
JOIN (
        SELECT w
        FROM T
        GROUP BY w
    ) AS B
ON (A.x = B.w)
ORDER BY S.y;
```

- ○ 5
- ○ 8
- ○ 9
- ○ 10

4. (1 point) You construct a B+-Tree from scratch in which nodes have 3 keys. Which keys are in the root after inserting the following sequence of keys: $< 1, 2, 3, 5, 6, 7, 4, 0, -1 >$.

- ○ [3,6,1]
- ○ [3]
- ○ [1,3,6]
- ○ [1,3,4]

5. (1 point) Assume that you have the undo log below and you want to perform a checkpoint. What is the minimum number of additional records that must be added to the log file before $< CKPT >$ can be added?

<START T1>
<START T2>
<T1, A, 4>
<ABORT T1>
<T2, A, 5>
<START T3>
<T3, B, 6>
<T2. C, 7>
<T3, C, 5>
<T3, D, 1>
<COMMIT T2>

- ◯ 0
- ◯ 1
- ◯ 2
- ◯ 3

Answer Key

Question 1

Calculate Disk0 $\oplus$ Disk2.

Feedback: Indeed, from the property $x + y(mod2) = z \Rightarrow y = x + z(mod2)$.

Question 2

12

Question 3

8

Feedback:
Three table scans
Two joins (with complex join conditions)
One group by
One order by
One projection

Note: It is not possible to remove more than this without affecting the query semantics.

Question 4

[1,3,6]

Question 5

1

Feedback: Indeed, we only need to commit T3.