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COMP 5120 D01

Problem 1:
1. True
2. True
3. False
4. True
5. False
6. False
7. True
8. True
9. False
10. True

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Problem 2:

1: Print level and average age:

```
SELECT   level,  AVG(age) as average_age
FROM     student,
GROUP  BY  level;
```

2: seniors in John Doe class:

```
SELECT DISTINCT   sname
FROM   Student, Enrolled, Class, Faculty
WHERE student.snum = Enrolled.snum
AND   Enrolled.cname = Class.cname
AND  class.Fid = Faculty.fid
AND  student.level = 'SR'
AND  Faculty.fname = 'John Doe';
```

3: Shelby 1120 or 3 students or more

```
SELECT DISTINCT   cname
FROM   Class
WHERE  room = 'Shelby 1120'
OR  cname IN  (
        SELECT
        FROM
        GROUP BY
        HAVING  COUNT(*)  >= 3
        );
```
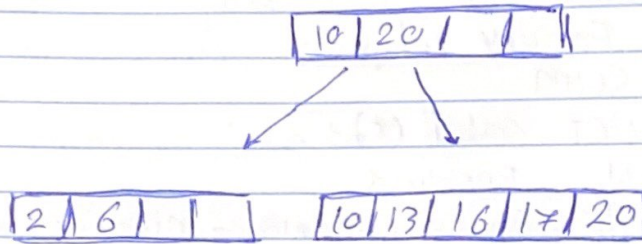
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4: Faculty with enrollment < 10
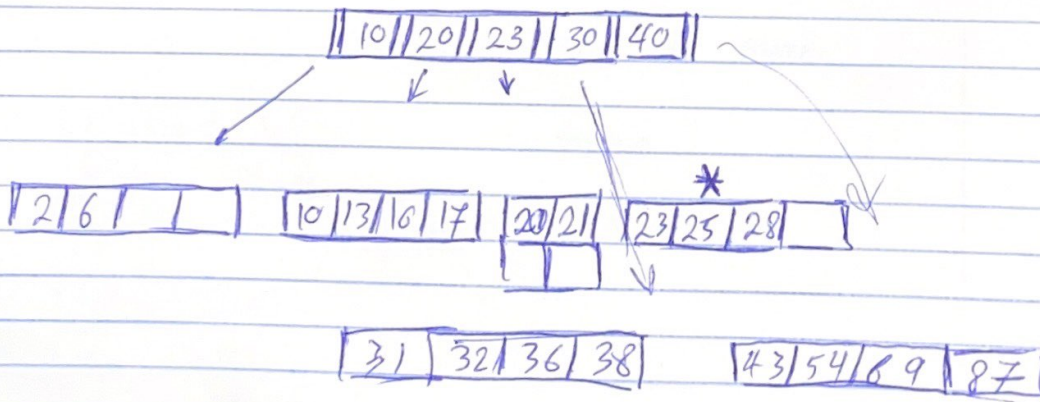
```
SELECT DISTINCT fname
FROM Faculty, Class
WHERE Faculty.fid = Class.fid
GROUP BY Faculty.fid
HAVING SUM
        SELECT count (*)
        FROM Enrolled
        WHERE Enrolled.cname = Class.cname
) < 10;
```

Problem 3:

1. Because it only has one node we must redistribute. i.e. "d-1" so it goes to the left sibling

```
          | 10 | 20 |  |  |
         /              \
   | 2 | 6 |  |  |      | 10 | 13 | 16 | 17 | 20 |
```

2.

```
          | 10 || 20 || 23 || 30 || 40 |
         /        ↓       ↓         \
                                      *
| 2 | 6 |  |  |   | 10 | 13 | 16 | 17 |  | 20 | 21 |  | 23 | 25 | 28 |  |

              | 31 | 32 | 36 | 38 |      | 43 | 54 | 69 | 87 |
```

Problem 4:

1. These 2 methods are used to improve disk
performance and fault tolerance.
   Data striping sends data to multiple disks to
   make access easier and increase read/write
   performance
   Redundency ~~[crossed out]~~ makes copies in multiple disks

2. Buffer manager manages data that is read
from the disk. It essentially tries to minimize
disk read requests that are needed by the user
It checks if needed page is already in the memory
If it isn't, it places it in a free buffer slot
and if there are no slots it removes a previous
unneeded requst for the new one

~~[three lines of scribbled-out text]~~

3. This pulls up quaries without accessing the data page, using the indexes that have all the needed data in the quary.
An Example is:

```
SELECT  name, age
FROM    Student
WHERE   id = '1234'
;
```

If the database is correctly made with indexes it can get needed dat without the Page it self.

4. ISAM are binary search trees that are balanced and store the data and Indexes separatley
B+ does the storage in the same file, but it gets the key value corresponding to the data in the same block.
ISAM gets the key value from the index file with the corresponding data in the file

B+ is better for range quaries because it's storage is done in sequential order.