

1. Sort Linked List :

Merge sort is the suitable algorithm to apply for this sorting linked List . Using Divide and Conquer Technique by finding the middle of the linked list , divide it between the start to the middle, the middle next to the end, then merge it back.

Online Solution :

<https://www.geeksforgeeks.org/merge-sort-for-linked-list/>

2. Word Ladder :

Breadth First Search (BFS) is the technique to solve this problem. Data can be modeled as Graph according to related words (for each input word). We build adjacency words by looping each character to permute the word and check if it's available in the dictionary.

Here is the online solution:

<https://www.geeksforgeeks.org/word-ladder-length-of-shortest-chain-to-reach-a-target-word/>

3. Sparse Matrix Multiplication

It's normal matrix multiplication. For Sparse Matrix there are many zero values in the matrix, to optimize it we just create another list and store only the one that value is not zero then work on this multiplication opt only.

Online solution :

<https://www.geeksforgeeks.org/operations-sparse-matrices/>

4. The Exam:

N - number of students, M - number of students who passed the Math exam, F - number of students who passed Physics, L - number of students who didn't pass any exam which means we can subtract L from N ($N = N - L$) then N becomes the number of students who passed the exam.

$MF = M + F - N$; // number of students who passed both exam

$M = M - MF$; // number of students who passed only Math

$F = F - MF$; // number of students who passed only Physics

Solution code: <https://ideone.com/3S26lw>

5. The Ladder:

We have to count the number of cubes for each step until we reach k. Then the answer will be the number of steps.

Solution code: <https://ideone.com/t6NOhy>

6. The Watermelons:

The answer is just min and max numbers from the list.

Solution code: <https://ideone.com/5HXwag>

7. The Blueberries:

For each i sum up 3 adjacent elements ($a[i-1] + a[i] + a[i+1]$) then the result will be max element among them.

Solution code: <https://ideone.com/Vpexx2>