

1. Sort the given strings with Radix sort. Write down the contents of each list associated with particular character after each phase (sorting by character at particular position) had been completed.
GKKG KEEG GKGG KGKK KGEE KEEG EGEE GEEG

2. Array A contains a nearly sorted sequence of strings (e.g. z 99% is sorted), array B contains the same set of strings in a random unsorted order. Radix sort sorts

- a) A faster than B
- b) B faster than A
- c) A equally fast as B and uses more memory to sort A
- d) A equally fast as B and uses more memory to sort B
- e) A equally fast as B and uses the same amount of memory to sort A and B

3. Sort the array of strings {"dda", "bab", "ddc", "aaa", "bcd", "dbc", "bbb", "add", "ccd", "dab", "bbc"} using radix sort. Write down the contents of the auxiliary arrays (s, e, d) after the array had been sorted by the last character.

4. We have to sort an array of 1000 different floating point numbers. Counting sort

- a) is applicable because of its linear complexity
- b) is applicable because of its sublinear complexity
- c) is applicable because the numbers can be converted to strings
- d) is not applicable because the floats might not have integer values
- e) is not applicable because the range of the values might be too big

5. Counting sort is applied to the array: 8 14 14 7 11 11 6 3 12 11 2 12 14 9 8
What will be the contents of the frequency array?

6. 15 integers are being sorted by Counting sort. We know the contents of the modified frequency array in the moment immediately before the sort starts filling the output array (gray numbers are array indices):

10	11	12	13	14	15	16	17	18	19
0	1	2	3	7	9	9	13	14	15

What is the contents of the output array?

7. Compute the value of the recursive function $f(6,7)$, use table with precomputed values.

$$f(x,y) = \begin{cases} 0 & \text{if } x = 0 \text{ or } y = 0 \\ 2f(x-1, y-1) + f(x-1, y) + f(x, y-1) + 1 & \text{otherwise} \end{cases}$$

8. Denote the binomial coefficient by the symbol $\text{Bin}(n,k)$. It is well known fact that the recursive relation holds: $\text{Bin}(n,k) = \text{Bin}(n-1,k) + \text{Bin}(n-1,k-1)$. The function returning $\text{Bin}(n,k)$ is thus defined as follows:

```
int bin(int n, int k) {
    if((n == 0) || (k == 0) || (n == k))
        return 1;
    return bin(n-1,k) + bin(n-1, k-1);
}
```

How many times will function bin() call itself during calculation of $\text{Bin}(6,4)$?

9. Find the longest common subsequence of sequences A and B:

- | | |
|---------------------|--------------------------------|
| a) | b) |
| A: 1100110011001100 | A: 110100100010000100001000001 |
| B: 1010101010101010 | B: 001011011101111011110111110 |

10. In the given matrix, the only possible movement is either to the east or diagonally to the north-east or to the south-east, always to the neighbouring column. Use the method of dynamic programming to find a path from the leftmost column to the rightmost column. The sum of values along the path should be minimum possible.

2	12	23	18
23	23	6	12
20	9	12	10
18	15	11	8
16	12	8	7