Hands On-4:

Problem-2:

fib(5) → fib(4) → fib(3) → fib(2) → fib(1) → fib(0) → fib(1) → fib(2) → fib(1) → fib(1) → fib(0)

Problem-1:

(2) Time Complexity:

$3+K+KN+K^2N+2$

$5+K+KN+K^2N$

using limit function

$$\lim_{\substack{K\to\infty \\ N\to\infty}} 5+K+KN+K^2N$$

$$\Rightarrow \lim_{\substack{K\to\infty \\ N\to\infty}} 1+\frac{1}{K}+\frac{1}{KN}+\frac{5}{K^2N}$$

$\Rightarrow$ 1 (a constant)

$\therefore T(K^2N) = \Theta(K^2N)$

(3) By using min heap, I can improve the implementation. It's an optimized approach to sort the K arrays of N no. of elements by preserving their order.

Problem-2:

(2) Time complexity:

$1+2N$

$$\lim_{N\to\infty} 2+\frac{1}{N} = 2 \text{ (a constant)}$$

$\therefore T(N) = \Theta(N)$.

(3) For removing duplicates the best time complexity is $O(N)$, we can optimize the code by reducing space complexity.