1.

a) time complexity: n^2, space complexity: const

2 loops, each loop repeat n times

No extra memory needed

b) time complexity: n^3, space complexity: n

3 loops, each loop repeat n times

Need n space memory for k

c) time complexity: n^2, space complexity: const

2 loops, each loop repeat n times

Need 1 space memory for tmp

2.

a) time complexity: logn, space complexity: const

first loop run logn times, second loop run i times

no extra memory needed

b) time complexity: n, space complexity: const

first loop run n times, second loop run i times

no extra memory needed

c) time complexity: nlogn, space complexity: const

first loop run logn times, second loop run n time

no extra memory needed

3.

	1 second	**1 hour**	**1 month**	**1 century**
log n	10^300000			
$\sqrt{n}$	10^12	1296*10^16	6718464*^18	
n	10^6	36*10^8	2592*10^9	31556736*10^8
N log n	62746	133378058		
N^2	1000	60000	1609968	56175382
N^3	100	1532	13736	146677

2^n	19	31	41	51
N!	9	12	15	17

4.

Algorithm

Low = 0; high = length -1; mid = (high – low) / 2

Loop through array

If mid element is red, swap mid element and low element, increase mid and low by one

If mid is blue, increase mid by 1

If mid is white, swap mid element and high element, decrease high by 1