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4th Grade

Question 1

```
missAppoint( A[], first, last)
    if first > last
        return last + 1
    if A[first] != first
        return first
    middle = (first + last) / 2
    if A[middle] = middle
        return missAppoint(A[], middle+1, last)
    return missAppoint(A[], first, middle)
```

Question 3

$T(2) = 1$

$T(n) = T(n^{1/4}) + 1, \quad n > 1$

$T(n^{1/4}) = T(n^{1/4^2}) + 1$

$T(n) = T(n^{1/4^2}) + 2$

$= T(n^{1/4^3}) + 3$

⋮ k times

$= T(n^{1/4^k}) + k$

Assume $n^{1/4^k} = 2$

$4^k = \log_2 n$

$k = \log_2 + \log_2 n$

$k = \frac{\log\log n}{2}$

$T(n) = T(2) + k$

$T(n) = 1 + \frac{\log\log n}{2}$

$O(\log\log n)$

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Question 2

inversion count for k=2 [33, 41, 9, 12, 17, 21]

is 8 → (33,9)(33,12)(33,17)(33,21)(41,9)(41,12)(41,17)(41,21)

Using the same method we can see inversion counts for

k=1 is 5
k=2 is 8
k=3 is 9
k=4 is 8
k=5 is 5

while n>6 so we can say the complexity of this insertion sort is

$O(n + k.(n-k))$

Question 5

m table:

a)

0	1000	6000	6250
	0	4000	4500
		0	500
			0

s table

	1	1	3
		2	2
			3

Question 6

23, 93, 4, 67, 5 2, 9, 44, 67, 1 → 23, 1, 4, 67, 5 2, 9, 44, 67, 93

pivot, low, high, pivot, low

→ 23, 1, 4, 9, 5, 2, 67, 44, 67, 93 → 2, 1, 4, 9, 5, 23, 67, 44, 67, 93

pivot, low, high, pivot

QS(2, 1, 4, 9, 5, 23)

QS(2, 1, 4)

(1, 2, 4)

QS(9, 5, 23)

(5, 9, 23)

QS(67, 44, 67, 93)

QS(44, 67)

QS(67, 93)