CSE310 HW02

1. T(n)=3\*T(n/2)+f(n), where f(n) ∈ Θ(n)

A=3 b=2 f(n)=n

Log23= 1.58

n1.58n1

Case1: f(n) =O(n1.58-e)

=O(n1.58-58)

=O(n1)

=O(n)

Hence we have case-1 satisfied

T(n) = Θ(nlogba)

T(n)= Θ(n1.59)

1. T(n)=3\*T(n/3)+6n+200logn

A=3 b=3 f(n)=6n+200logn

Log33=1=Θ(n).

6n+200logn=6nc where c =1

Hence Case 2 f(n)= Θ(n1) satisfies.

Then, T(n)= Θ(nlogn)

1. T(n)=5\*T(n/2)+3n3

a=5 b=2 f(n)=3n3

log25=2.32

n2.32n3

Case3: f(n)=Ω(nlog25+e)

=Ω(n2.32+.68)

=Ω(n3)

For sufficiently large n, we have that a\*f(n/b)=15(n3/8)c\*3n3 when c=5/8

Hence case-3 satisfied

T(n)= Θ(3n3)

1. Insertion sort: 9 7 6 8 4 5

The 1st element-wise comparison is: 7>9? (7 9 6 8 4 5)

The 2st element-wise comparison is: 6>9? (7 6 9 8 4 5)

The 3rd element-wise comparison is: 7>6? (6 7 9 8 4 5)

The 4th element-wise comparison is: 8>9? (6 7 8 9 4 5)

The 5th element-wise comparison is: 7>8? (6 7 8 9 4 5)

The 6th element-wise comparison is: 4>9? (6 7 8 4 9 5)

The 7th element-wise comparison is: 8>4? (6 7 4 8 9 5)

The 9th element-wise comparison is: 7>4? (6 4 7 8 9 5)

The 10th element-wise comparison is: 6>4? (4 6 7 8 9 5)

The 11th element-wise comparison is: 9>5? (4 6 7 8 5 9)

The 12th element-wise comparison is: 8>5? (4 6 7 5 8 9)

The 13th element-wise comparison is: 7>5? (4 6 5 7 8 9)

The 14th element-wise comparison is: 6>5? (4 5 6 7 8 9)

The 15th element-wise comparison is: 4>5? (4 5 6 7 8 9)

1. Quick sort: 9 7 6 8 4 5

The 1st element-wise comparison is: 9>5?

The 2nd element-wise comparison is: 7>5?

The 3rd element-wise comparison is: 6>5?

The 4th element-wise comparison is: 8>5?

The 5th element-wise comparison is: 4>5? (4 7 6 8 9 5)

The 6th element-wise comparison is: 4>5? (4 5 | 7 6 8 9 )

The 7th element-wise comparison is: 7>9? ( 4 5 | 6 7 8 9)

The 8th element-wise comparison is 8>9? (4 5 6 7 8 9)