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**Problem 1:**

T(n) = T(n-1)+n+c

T(n-1) = T(n-2)+(n-1)+c

T(n-2) = T(n-3)+(n-2)+c

T(n) = T(n-2)+(n-1)+c+n+c

= T(n-3)+(n-2)+c +(n-1)+c+n+c

= T(n-3)+(n-2)+(n-1)+n +3c

T(n) = T(n-k) + (n-(k+1)) + (n-(k+2)) + .. + n + kc

**O(n2)**

**Problem 2:**

0 ≤ c1g(n) ≤ f(n) ≤ c2g(n)

0≤ c1loga(n) ≤f(n)≤c2logb(n)

loga(n) = logd(n)/logd(a)

logb(n) = logd(n)/logd(b)

0≤ c1 (logd(n)/logd(a)) ≤f(n)≤c2 (logd(n)/logd(b))

= 0≤ (c1/logd(a)) x logd(n) ≤f(n)≤ (c2/logd(b)) x logd(n)

= 0≤ C x logd(n) ≤f(n)≤ C x logd(n)

= 0≤ logd(n) ≤f(n)≤ logd(n)

**Problem 4:**

**Best case**

T(n) = 2T(n/2)+cn

T(n/2) = 2T(n/4)+cn/2

T(n/3) = 2T(n/6)+cn/3

T(n) = 2(2T(n/4)+cn/2)+cn

= 4T(n/4)+4cn/2+cn

= 4T(n/4)+2cn+cn

T(n/k) = 2T(n/2k)+cn/k

T(n/n) = 2T(n/2n)+cn/n

= 2T(n/2n)+c

= cT(n/2n)+c

= T(n/2n)

**= Omega(log2(n))**

**Worst case**

T(n) = T(n-1)+cn

T(n-1) = T(n-2)+c(n-1)

T(n-2) = T(n-3) + c(n-2)

T(n) = T(n-2)+c(n-1)+cn

T(n) = T(n-3) + c(n-2) +c(n-1)+cn

T(n) = T(n-k)+c(n-k+1) + c(n-k+2) + … + c(n-2) + c(n-1) + cn