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CMSC341

Homework2

10/2/14

1. Prove 1+2^1+2^2+2^3+…+2^n=2^(n+1)-1

1+2^1+2^2+2^3+…+2^n= ,

when n=0, left=1, right =1

when n=k, ,- = 2^(k+1)-1 => 2-=2^(k+1)-1

so

when n=k+1, ==2^(k+1)+2^(k+1)-1=2\*2^(k+1)-1=2^((k+1)+1)-1

then 1+2^1+2^2+2^3+…+2^n=2^(n+1)-1

1. Prove 1^3+2^3+…+n^3=((n+1)n/2)^2 n>=1

When n=1 1^3=1,

Pretend that n=k, 1^3+2^3+…+k^3 =

When n=k+1, 1^3+2^3+…+k^3+(k+1)^3= =

So

1. , n>=2

When n=2,

So when n = k,

So

So



|  |  |  |  |
| --- | --- | --- | --- |
| Code | Cost | # | total |
| sum = 0;  for ( i = 0; i < n; i++ )  for (j = 0; j < n; j++ )  ++sum; | 0 | 0 | 0 |
| 1 | n | N+1 |
| 2 | n | N+2 |
| n | N^2+n^2 | 2N^2+n |
| Final |  |  | 2N^2+n |
|  |  |  | O(N^2) |



|  |  |  |  |
| --- | --- | --- | --- |
| Code | Cost | # | total |
| sum = 0;  for( i = 0; i < n; i += 2 )  for( j = 0; j < n; j++ )  ++sum; | 0 | 0 | 0 |
| 2 | 1 | 2 |
| 4 | 2 | 6 |
| n | n | 2n |
| Final |  |  | 2+6+2n |
|  |  |  | O(n) |



|  |  |  |  |
| --- | --- | --- | --- |
| Code | Cost | # | total |
| sum = 0;  for( i = 1; i < n; i \*= 2 )  for( j = 0; j < n; j++ )  ++sum; | 1 | 0 | 1 |
| 2 | 1 | 1 |
| n | logn | Logn |
| Final |  |  | Logn |
|  |  |  | O(Logn) |

|  |  |  |  |
| --- | --- | --- | --- |
| Code | Cost | # | total |
| sum = 0;  for( i = 0; i < n; i++ )  for( j = 0; j < i \* i; j++ )  for ( k = 0; k < j; k++ )  ++sum; | 1 | N^2\*n^2 | N^4 |
| 2 | N^2\*n^2 | N^4 |
| n | N^2\*n^2 | n\*n^2\*n^2 |
| Final |  |  | N^5 |
|  |  |  | O(N^5) |