Day 10 DSA

Excersize 1

$C = A \times B$

$A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$

If we go by class:

Ex 2×2

$c_{11} = a_{11}b_{11} + a_{12}b_{21}$ ← Basically 2 MULT., 1 add

$c_{12}\ a_{11}b_{12} + a_{12}b_{22}$

$c_{21}\ a_{21}b_{11} + a_{22}b_{21}$ → n^3 operations

$c_{22}\ a_{21}b_{12} + a_{22}b_{22}$

W/ Divide and conquer

It would be a $n/2 \times n/2$ because making boxes for each value

→ would be the same (8 mult., 4 add.)

$$T(n) = 8T(n/2) + O(n^2)$$

$\log_2 8 = 3$ $\quad n^2 < n^3$

$$T(n) = \Theta(n^3)$$

Excersize 2

x^n when positive → n is even vs. odd

even: $(x^{n/2})^2$

odd: $(x^{n-1/2})^2 \cdot x$ ← need the extra x for odd; or else it would be even

$$T(n) = T(n/2) + O(1)$$

↳ dividing by $\log_2 n$ for this step

→ $T(n) = \Theta(\log n)$ → faster than $\Theta(1)$

Excersize 3

2 3 3 5 | 4 6

→ can split into 2 groups (left, right, w/ middle)

$$T(n) = 2T(n/2) + O(n)$$

← we just want A max sum

↳ $T(n) = \Theta(n \log n)$