CS3230 Finals Q2

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2. a) Using master theorem

$a=4,\ b=2 \qquad f(n)= n^2 \lg n$

$k=1$

$f(n) = \Theta(n^{\log_2 4} \lg^k n)$

$= \Theta(n^2 \lg n)$

$T(n) = \underline{\Theta(n^2 \lg^2 n)}$ //

b) $T(n) = \underline{\Theta(n)}$ //

c) let $m = \lg n \Rightarrow 2^m = n$

$T(2^m) = T(2^{\frac{m}{2}}) + 3230$

let $s(m) = T(2^m)$

$s(m) = s(\frac{m}{2}) + 3230 \qquad \Rightarrow s(m) = \Theta(3230 \lg m)$

$T(n) = s(m) = \underline{\Theta(3230 \lg \lg n)}$ //

d) $T(n) = \underline{\Theta(n^2)}$ //

e) $T(n) = \Theta(n^2)$ $\quad \sum_{i=0}^{\lfloor \lg n \rfloor} 4^i + \sum_{i \text{ not power of 2}}^{2 \lg n} 3$ $\quad 2 \quad n^2$

amortized cost per operation is $\underline{\Theta(n)}$ //