Problem Set 2

1) $T(n) = 2T(\frac{2}{3}n) + n^2$

1.2) Give asymptotic upper bounds using Master Method

The master method can be described through the form :

$$T(n) = aT(n/b) + f(n)$$

Fitting the constants a and b into the given equation from the question we can conclude :

We have a number $a = 2$ subproblems, each dividing the root input into $b = 3/2$.

Now, $log_{\frac{2}{3}}(2) = 1.70951129$

let $\epsilon = 0.1$

Now, $\because n^2 > n^{log_{\frac{2}{3}}(2)+0.1} \Rightarrow n^2 > n^{1.80951..}$

This falls under **case 3** of the master theorem. This means that $f(n) = \Omega(n^{log_{\frac{2}{3}}(2)+0.1})$ so $T(n) = \Theta(f(n))$

Since we have discovered the tight bound on $T(n)$, the upper bound $O(n)$ will be the same as the tight bound.