Algorithms 資格考 November 2017

1. (10%) Give formal definitions of $\Theta(g(n)), O(g(n))$, and $\Omega(g(n))$.
2. (10%) Use the master method to show the tight bound for $T(n) = T(\frac{2}{3}) + 1$. Assume that $T(n)$ is constant for sufficiently small n.
3. (10%) Use the master method to show the tight bound for $T(n) = 3T(\frac{n}{4}) + n\lg n$.
4. (20%) Show that any comparison sort algorithm requires $\Omega(n\lg n)$ comparisons in the worst case.
5. (10%) Present the Dijstra's algorithm.
6. (10%) Present the Kruskal algorithm.
7. (10%) Show that $f(n) = \Theta(g(n))$ if and only if $g(n) = \Theta(f(n))$.
8. (20%) Show how to sort n integers in the range 0 to $n^2 - 1$ in $O(n)$ time..