CS302 - Assignment 3
Due: Thursday, Feb. 23 at the beginning of class
Hand-in method: paper

http://recursivelyrecursive.wordpress.com/category/recursive-humour/

For this assignment you must use latex to generate your work.

1. Give the asymptotic bounds for each of the recurrences below. Assume that $T(n)$ is constant for sufficiently small n. Make your bounds as tight as possible. If you use the master method, you must specify Θ bounds, but only need to specify O if you use another approach.

   (a) $T(n) = 9T(n/3) + n^2$

   (b) $T(n) = 2T(n/2) + n^3$

(c) $T(n) = 3T(n/2) + n \log n$

(d) $T(n) = T(n-2) + n$

(e) $T(n) = 4T(n/2) + n^2 \sqrt{n}$

(f) $T(n) = T(\sqrt{n}) + 1$

2. (5 points) You decide that `Merge-Sort` isn't fast enough for you and you want to improve it. You write a procedure `Merge3` that takes three sorted lists as arguments and merges them into one sorted list. The runtime of this method is $\Theta(n)$ where n is the sum of the lengths of the three lists. Write a new merge sort procedure using pseudocode that uses `Merge3` by splitting the list into three. Calculate the overall runtime of this procedure including the calls to `Merge3`. Is your "improved" version asymptotically faster than the original?

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