Practice Problems

Problem1

Solve the following recurrences and compute the asymptotic upper bounds. Assume that T(n) is a constant for sufficiently small n. Make your bounds as tight as possible.

a. $T(n) = 2T\left(\frac{n}{2}\right) + n^4$

b. $T(n) = T\left(\frac{7n}{10}\right) + n$

c. $T(n) = 16T\left(\frac{n}{4}\right) + n^2$

d. $T(n) = 7T\left(\frac{n}{3}\right) + n^2$

e. $T(n) = 2T\left(\frac{n}{4}\right) + \sqrt{n}$

Problem 2

Rank the following functions by order of growth; that is, find an arrangement $g_1, g_2, \ldots g_{20}$ of the functions satisfying $g_1=\Omega(g_2), g_2 = \Omega(g_3), \ldots, g_{19} = \Omega(g_{20})$. Partition your list into equivalence classes such that functions f (n) and g(n) are in the same class if and only if f (n) = θ(g(n)).

$\sqrt{2}^{lgn}$	n^2	$n!$	$(lgn)!$	$(3/2)^n$
n^3	$(lgn)^2$	$\lg(n!)$	2^{2^n}	$lnln(n)$
$n.2^n$	2^{lgn}	e^n	4^{lgn}	$(n+1)!$
n^n	2^2	$nlgn$	1	n