Assignment 1. Asymptotic Growth

Sort all the functions below in increasing order of asymptotic (big-O) growth. If some have the same asymptotic growth, then be sure to indicate that. As usual, lg means base 2.

1. 5n
2. 4 lg n
3. 4 lg lg n
4. n^4
5. $n^{1/2}$ $lg^4 n$
6. $(lg\ n)^{5lg\ n}$
7. $n^{lg\ n}$
8. 5^n
9. 4^{n^4}
10. $(n/4)^{(n/4)}$

Assignment 2. Solving Recurrences

Give asymptotic upper and lower bounds for T (n) in each of the following recurrences. Assume that T (n) is constant for n ≤ 2. Make your bounds as tight as possible, and justify your answers.

(a) T (n) = 4T (n/4) + 5n
(b) T (n) = 4T (n/5) + 5n
(c) T (n) = 5T (n/4) + 4n
(d) T (n) = 25T (n/5) + n^2
(e) T (n) = 4T (n/5) + lg n
(f) T (n) = 4T (n/5) + lg^5(n √ n)
(g) T (n) = 4T (√ n) + lg^5 n
(h) T (n) = 4T (√ n) + lg^2 n
(i) T (n) = T (n/2) + 2T (n/5) + T (n/10) + 4n