Additional problems and exercices

No credit, No due date

You are encouraged to work on the following exercises

If you have any questions ask the instructor during office hours

Exercise 0.

Do the Exercides of the textbook for the chapters/sections covered in class. The more you do of them the more you practice.

Exercise 1.

Solve the following recurrences. You may assume $T(1) = \Theta(1)$, where necessary. Make your bounds as tight as possible. Use asymptotic notation to express your answers. Justify your answers.

a. $T(n) = 2T(n/8) + n$
b. $T(n) = 9T(n/3) + n \lg^2 n$
c. $T(n) = 3T(n/9) + n^2$
d. $T(n) = 2T(n/4) + \sqrt{n}$
e. $T(n) = 4T(n/2) + n$.
f. $T(n) = 2T(n/16) + n^{1/4}$.
g. $T(n) = T(n/2) + 1$, $T(1) = 1$.

Exercise 2.

Solve the following recurrences. Make your bounds as tight as possible. Use asymptotic notation to express your answers. Justify your answers.

a. $T(n) = T(n/8) + T(7n/8) + n \lg n \quad T(1) = 100$
b. $T(n) = T(n/5) + T(3n/4) + 10n \quad , \quad T(1) = 20.$

Exercise 3.

Find an asymptotically tight bound for the following recurrence. You may assume $T(1) = \Theta(1)$. Justify your answer.

$T(n) = T(n/8) + T(3n/4) + 8n.$

Exercise 4.

Solve exactly using the iteration method the following recurrence. You may assume that n is a power of 3, ie $n = 3^k$.

$$T(n) = 3T(n/3) + n, \text{ where } T(1) = 1.$$