Solutions to Exercises

Resolve the following recurrence relations using the differnt methods presented in this lecture (recall that $T(c) = \Theta(1)$ for any constant $c \geq 0$).

- $T(n) = 8T(n-2) + \Theta(1) = \Theta((\sqrt{8})^n)$
- $T(n) = 8T(n-2) = \Theta((\sqrt{8})^n)$
- $T(n) = T(n-2) + \Theta(n) = \Theta(n^2)$
- $T(n) = T(n-2) + \Theta(1) = \Theta(n)$
- $T(n) = T(n-2) = \Theta(1)$
- $T(n) = 2T(n-4) + \Theta(1) = \Theta(2^{n/4}) = \Theta((\sqrt[4]{2})^n)$
- $T(n) = 3T(n-4) + \Theta(1) = \Theta(3^{n/4}) = \Theta((\sqrt[4]{3})^n)$

Solutions to Exercises

Resolve the following recurrence relations using the diffrent methods presented in this lecture (recall that $T(c) = \Theta(1)$ for any constant $c \geq 0$).

- $T(n) = T(\frac{n}{2}) = \Theta(1)$
- $T(n) = 2T(\frac{n}{2}) + 1 = \Theta(n)$
- $T(n) = 2T(\frac{n}{2}) + n = \Theta(n \log n)$
- $T(n) = 2T(\frac{n}{2}) + n^2 = \Theta(n^2)$
- $T(n) = 6T(\frac{n}{2}) + 2n^3 = \Theta(n^3)$
- $T(n) = 9T(\frac{n}{3}) + n^2 = \Theta(n^2 \log n)$
- $T(n) = 10T(\frac{n}{6}) + \Theta(1) = \Theta(n^{\log_6 10})$

Solutions to Exercises

Consider the following recurrence relations (recall that $T(c) = \Theta(1)$ for any constant $c \geq 0$). Make a guess on what should be the best possible asymptotic bounds for each of them, based on equations for which you already know the result and/or recursion trees. Try to prove your guesses using the substitution method.

- $T(n) = T(\lfloor \frac{n}{2} \rfloor) + T(\lceil \frac{n}{2} \rceil) + n = \Theta(n \log n)$
- $T(n) = T(\frac{n}{4}) + T(\frac{3n}{4}) + n = \Theta(n \log n)$
- $T(n) = T(\frac{n}{4}) + T(\frac{3n}{4}) + 1 = \Theta(n)$
- $T(n) = T(\frac{n}{4}) + T(\frac{3n}{4}) + n^2 = \Theta(n^2)$
- $T(n) = T(\frac{n}{3}) + T(\frac{2n}{3}) + n^3 = \Theta(n^3)$