4 uždavinys: Išspęsti lygtį

$$T(n) = T\left(\frac{n}{2}\right) + \log_2 n$$

Sudarome, medį:

$$\log_2(n) \longrightarrow \log_2 \frac{n}{2} \longrightarrow \log_2 \frac{n}{2^2} \longrightarrow \log_2 \frac{n}{2^3} \longrightarrow \cdots \longrightarrow \log_2 \frac{n}{2^{\lfloor \log_2 n \rfloor}} \approx \Theta(1)$$

Aukštis $h = \log_2 n$

$$T(n) = \sum_{i=1}^{h} \log_2 \frac{n}{2^i} = \sum_{i=1}^{h} (\log_2 n + i) = h \log_2 n + \sum_{i=1}^{h} i = h \log_2 n + \frac{h(h+1)}{2} = \Theta(\log_2^2 n)$$

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5 uždavinys: Išspęsti lygtį

$$T(n) = T\left(\frac{n}{2}\right) + \log_2^2 n$$

Sudarome, medį:

$$\log_2^2(n) \longrightarrow \log_2^2 \frac{n}{2} \longrightarrow \log_2^2 \frac{n}{2^2} \longrightarrow \log_2^2 \frac{n}{2^3} \longrightarrow \cdots \longrightarrow \log_2^2 \frac{n}{2^{\lfloor \log_2 n \rfloor}} \approx \Theta(1)$$

Aukštis $h = \log_2 n$

$$T(n) = \sum_{i=1}^{h} \log_2^2 \frac{n}{2^i} = \sum_{i=1}^{h} (\log_2 n + i)^2 = h \log_2^2 n + 2 \log_2 n \sum_{i=1}^{h} i + \sum_{i=1}^{h} i^2$$

$$= h \log_2^2 n + 2 \log_2 n \frac{h(h+1)}{2} + \frac{h(h+1)(2h+1)}{6} = \Theta(\log_2^3 n)$$