

CMSC 441: Homework #10 Solutions

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Exercise 9.2–4

The RANDOMIZED-SELECT algorithm will degenerate into its worst-case performance if the pivot sequence is 9, 8, 7, 6, 5, 4, 3, 2, 1.

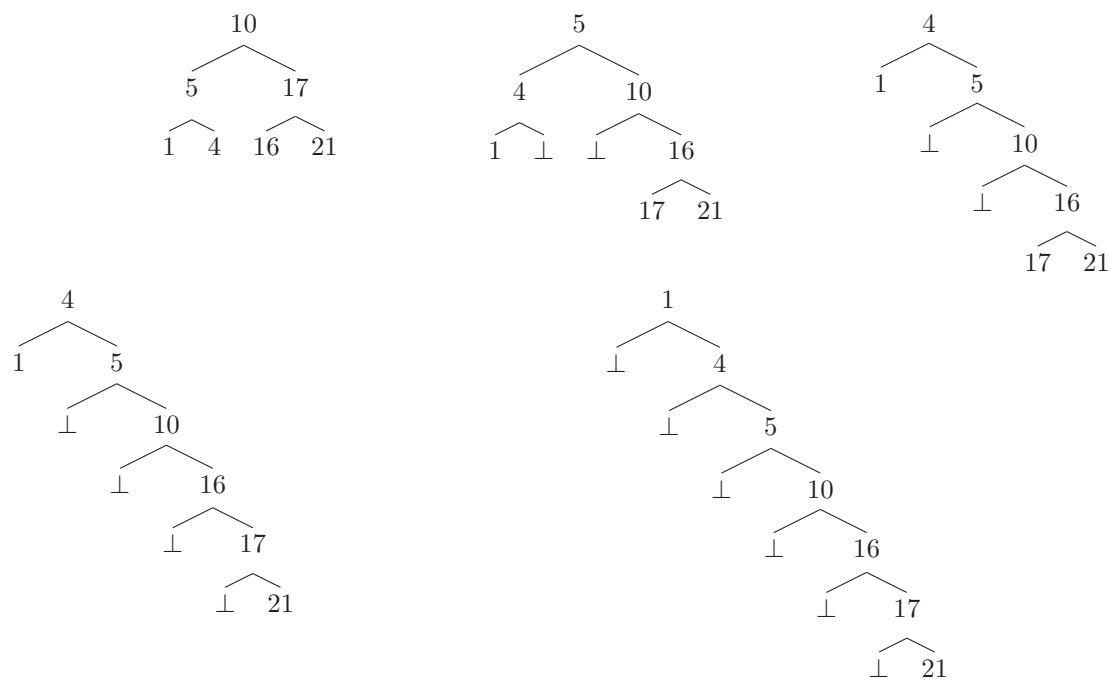
Exercise 11.2–2

28	19	10
20		
12		
20		
5		
15	33	
17		

Exercise 11.3–4

$A = \frac{\sqrt{5}-1}{2} = 0.618$. Thus, $\lfloor m(kA \bmod 1) \rfloor$ for 61, 62, 63, 64 are 700, 318, 936, and 554.

Exercise 12.1–1



Exercise 12.2–1

Search sequences c and e can not occur in binary-tree search for 363. In c, $912 > 911$ occurs in the left subtree rooted at 911. In e, $299 > 278$ occurs in the right subtree rooted at 278.



Problem 6

Compute the 4 point DFT of

$$A(x) = 1 + 2x + 3x^2 + 4x^3$$

Solution:

$N = 4$ and 4th root of unity w , is $e^{2\pi i/4} = -i$.

$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & \omega & \omega^2 & \omega^3 \\ 1 & \omega^2 & \omega^4 & \omega^6 \\ 1 & \omega^3 & \omega^6 & \omega^9 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} = \begin{bmatrix} 10 \\ -2 + 2i \\ -2 \\ -2 - 2i \end{bmatrix}$$

Consider the last row of result, $[1 \ \omega^3 \ \omega^6 \ \omega^9] \cdot [1 \ 2 \ 3 \ 4]^T = 1 \cdot 1 + 2\omega^3 + 3\omega^6 + 4\omega^9 = 1 + 2i - 3 - 4i = -2 - 2i$. The other rows of result are computed similarly. The DFT is $10, (-2 + 2i), -2, (-2 - 2i)$.