

## Assignment 03

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[Page 404] 15.5-2: Determine the cost and structure of an optimal binary search tree for a set of  $n=7$  keys with the following probabilities:

$i$	0	1	2	3	4	5	6	7
$p_i$		0.04	0.06	0.08	0.02	0.10	0.12	0.14
$q_i$	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05

[Page 422] 16.1-3: Not just any greedy approach to the activity-selection problem produces a maximum-size set of mutually compatible activities. Give an example to show that the approach of selecting the activity of least duration from among those that are compatible with previously selected activities does not work. Do the same for the approaches of always selecting the compatible activity that overlaps the fewest other remaining activities and always selecting the compatible remaining activity with the earliest start time.

[Page 436] 16.3-2: Prove that a binary tree that is not full cannot correspond to an optimal prefix code.

[Page 436] 16.3-2: Prove that if we order the characters in an alphabet so that their frequencies are monotonically decreasing, then there exists an optimal code whose codeword lengths are monotonically increasing.

[Page 611] 22.3-5: Show that edge  $(u, v)$  is

- a. a tree edge or forward edge if and only if  $u.d < v.d < v.f < u.f$ ,
- b. a back edge if and only if  $v.d \leq u.d < u.f \leq v.f$ , and
- c. a cross edge if and only if  $v.d < v.f < u.d < u.f$