# CISC 3220 Homework Chapter 8 $\,$

### Rachel Friedman

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### Exercise 8.1

#### Question 8.1-1

What is the smallest possible depth of a leaf in a decision tree for comparison?

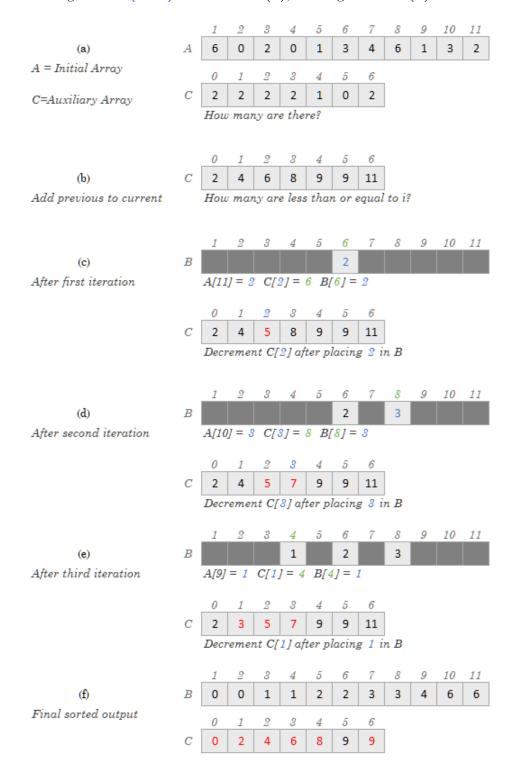
In a best case scenario, each element is compared only once with another element. Therefore, there are n-1 comparisons, which is equivalent to a path of length n-1.

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### Exercise 8.2

#### Question 8.2-1

Illustrate the operation of COUNTING-SORT on the array A = (6, 0, 2, 0, 1, 3, 4, 6, 1, 3, 2). Running time:  $\Theta(n + k)$ . And if  $k = \mathcal{O}(n)$ , running time is  $\Theta(n)$ .



# Exercise 8.3

# Question 8.3-1

Illustrate the operation of RADIX-SORT on the following list of English words: COW, DOG, SEA, RUG, ROW, MOB, BOX, TAB, BAR, EAR, TAR, DIG, BIG, TEA, NOW, FOX.

Running time:  $\Theta(d(n+k))$ .

PASS 1	PASS 2	PASS 3
SEA	$\mathrm{T}_{\mathbf{A}}^{\mathbf{A}}\mathrm{B}$	$_{\rm BAR}$
$\mathrm{TE} \mathbf{A}$	BAR	BIG
MOB	$\mathbf{E}_{\mathbf{A}}^{\mathbf{A}}\mathbf{R}$	$\mathbf{B}\mathbf{O}\mathbf{X}$
TAB	$\mathrm{T}_{\mathbf{A}}^{\mathbf{A}}\mathrm{R}$	${}^{\text{COW}}$
DOG	$\mathbf{SEA}$	DIG
RUG	${ m TEA}$	DOG
DIG	$\overline{\mathrm{DIG}}$	EAR
BIG	$\mathrm{B}^{\mathbf{I}}\mathrm{G}$	FOX
BAR	MOB	MOB
$\mathrm{EAR}$	DOG	NOW
TAR	$C_{\mathbf{O}}^{\mathbf{O}}\mathbf{W}$	ROW
COW	$R_{\mathbf{O}}^{\mathbf{O}}W$	RUG
ROW	$N_{\mathbf{O}}\mathbf{W}$	${ m SEA}$
NOW	BOX	TAB
BOX	FOX	$\mathbf{T}\mathbf{A}\mathbf{R}$
FO <mark>X</mark>	$R_{\mathbf{U}}^{\mathbf{U}}G$	$\mathbf{T}\mathbf{E}\mathbf{A}$