

Student Name: _____

J#: _____

CSC 323 Algorithm Design and Analysis, Fall 2017
Instructor: Dr. Natarajan Meghanathan

Quiz 4 (Take Home)

Due: Oct. 24, 2017: 11.30 AM

Max. Points: 50

Submission: Print this quiz, answer in the space provided and submit a hardcopy (either printed or handwritten-version in class at 11.30 AM)

Q1-32 pts) Construct a Huffman code for the following data (show all steps):

Student Name	Frequency of Symbols					Test Symbol Sequence
	A	B	C	D	E	
Armon Clark	0.21	0.35	0.16	0.08	0.20	BEAAEDDEBB
Daniel Epps	0.34	0.12	0.07	0.37	0.10	AADADDECCD
Allee Gammons	0.40	0.20	0.21	0.09	0.10	ACAAECEAEAB
Menlik Getachew	0.25	0.20	0.28	0.15	0.12	BADBCDECB
Taylor Hasty	0.15	0.24	0.14	0.27	0.20	AEBBADCBBE
Derrick Jackson	0.50	0.2	0.1	0.05	0.15	ACBDAABDAC
Devario Lewis	0.45	0.18	0.19	0.07	0.11	BEBAAABCBA
Jai-Michael McMillian	0.29	0.07	0.10	0.20	0.34	EEAEAEDEEE
Nahu Merawi	0.20	0.30	0.15	0.25	0.10	ABBCBAACBD
Taj Nelson	0.35	0.30	0.12	0.20	0.03	AADADBCABB
Patricia Perry	0.10	0.16	0.54	0.12	0.08	BCCADCCCCC
Daniel Powell	0.44	0.22	0.11	0.04	0.19	AAABBEABEA
Aiyanna Price	0.28	0.27	0.15	0.14	0.16	ACEDDCBACA
Allaysia Roberts	0.10	0.29	0.21	0.32	0.08	BBDBBADDDC
Dreshon Sanders	0.25	0.32	0.14	0.05	0.24	BBAABECDBABC
Miracle Williams	0.02	0.08	0.56	0.23	0.11	CCCDDECCCABA
Michael Wilson	0.18	0.10	0.45	0.12	0.15	CAABCACCACCB

- (a) Determine the average number of bits per symbol.
- (b) Determine the generic compression ratio compared to fixed-length encoding.
- (c) Encode the given text symbol sequence using the Huffman code that you determined. Compute the compression ratio achieved for this text compared to fixed-length encoding.

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Q2-18 pts) Draw a binary search tree for the following sorted array, and determine the average number of comparisons for a successful search and an unsuccessful search.

Student # / Name	Array
Armon Clark	[4, 8, 16, 26, 30, 33, 46, 64, 74, 95, 99]
Daniel Epps	[16, 22, 40, 58, 60, 65, 68, 70, 75, 79, 89, 95]
Allee Gammons	[22, 32, 41, 52, 56, 59, 69, 74, 79, 83, 89, 92, 99]
Menlik Getachew	[3, 22, 30, 36, 49, 52, 64, 75, 89, 93, 96, 99]
Taylor Hasty	[20, 23, 26, 29, 36, 40, 49, 54, 62, 69, 79, 88, 92]
Derrick Jackson	[5, 9, 12, 15, 19, 22, 30, 50, 54, 57, 78, 84, 94]
Devario Lewis	[8, 14, 19, 34, 37, 40, 43, 46, 49, 54, 77, 87, 95]
Jai-Michael McMillian	[3, 20, 28, 34, 41, 48, 54, 63, 84, 89, 97]
Nahu Merawi	[20, 26, 30, 42, 60, 66, 69, 73, 81, 87, 91]
Taj Nelson	[5, 19, 23, 29, 33, 39, 51, 65, 70, 77, 83, 89, 95]
Patricia Perry	[27, 38, 47, 56, 60, 64, 68, 72, 78, 84, 89, 97]
Daniel Powell	[4, 10, 16, 19, 25, 36, 45, 52, 55, 61, 69, 97]
Aiyanna Price	[12, 22, 27, 32, 40, 44, 49, 53, 63, 99]
Allaysia Roberts	[1, 4, 7, 10, 13, 41, 66, 76, 81, 91, 96]
Dreshon Sanders	[12, 21, 23, 25, 28, 30, 34, 40, 42, 48, 56, 59, 61]
Miracle Williams	[10, 14, 17, 19, 25, 30, 32, 35, 38, 45, 50]
Michael Wilson	[5, 8, 12, 18, 24, 29, 32, 38, 44, 48, 52, 56]

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