

Homework 4, Due Monday, February 4, 2013

Problem 1 (10 points):

Chapter 4, Exercise 2, Page 189.

Problem 2 (10 points):

Chapter 4, Exercise 8, Page 192. (Hint: Fact 4.17)

Problem 3 (10 points):

Chapter 4, Exercise 20, Page 199.

Problem 4 (10 points):

Build the Huffman code for the English alphabet using the following letter frequencies:

a	8.167	f	2.228	k	0.772	o	7.507	s	6.327	w	2.360
b	1.492	g	2.015	l	4.025	p	1.929	t	9.056	x	0.150
c	2.782	h	6.094	m	2.406	q	0.095	u	2.758	y	1.974
d	4.253	i	6.966	n	6.749	r	5.987	v	0.978	z	0.074
e	12.702	j	0.153								

Corrected data, 1-30-13.

Problem 5 (10 points):

Solve the following recurrences:

a) $T(n) = 2T(n/2) + n^3$ for $n \geq 2$; $T(1) = 1$;

b) $T(n) = T(9n/10) + n$ for $n \geq 2$; $T(1) = 1$;

In this and the following problems, you can ignore rounding issues (just round down to the nearest integer). A big-Oh answer is sufficient.

Problem 6 (10 points):

Solve the following recurrences:

a) $T(n) = 16T(n/4) + n^2$ for $n \geq 2$; $T(1) = 1$;

b) $T(n) = 7T(n/3) + n^2$ for $n \geq 2$; $T(1) = 1$;

Problem 7 (10 points):

Solve the following recurrences (if you are stuck on these, ask for help from the instructor, TA, or someone else. Don't spend too much time on them):

a) $T(n) = T(\lfloor \sqrt{n} \rfloor) + 1$ for $n \geq 2$; $T(1) = 1$;

b) $T(n) = 2T(\lfloor \sqrt{n} \rfloor) + 1$ for $n \geq 2$; $T(1) = 1$;

Clarification: Treat the square root as an integer valued function which rounds down to the integer below. The formula's have been updated.