

Homework Assignment 4

CS 330 Discrete Structures
Spring Semester, 2015

Due: Friday, March 13, 2015

1. Solve the following problems using the operator method discussed in class and given in the notes:

- (a) Page 511, exercise 12
- (b) Page 525, exercise 28
- (c) Page 526, exercise 40

If the roots of the recurrence are not integers, just get the *form* of the solution in each case for symbolic roots, together with the simultaneous equations that determine the coefficients.

2. Solve the following problems using secondary recurrences together with the operator method discussed in class and given in the notes:

- (a) Page 536, exercise 36
- (b) Derive all three cases of the Master Theorem on page 532 (we did part of this in class).
- (c) In the notes, the recurrence $T(n) = \sqrt{n} \cdot T(\sqrt{n}) + n$ is solved by a recursion tree (page 13 of the notes) and again by the “guess-and-confirm” method in section 1.6.3. Solve it by means of a secondary recurrence (section 1.5.3), together with the operator method.

3. (a) Prove that $1/89 = 1/10^2 + 1/10^3 + 2/10^4 + 3/10^5 + 5/10^6 + 8/10^7 + \dots$. (*Hint*: $89 = 10^2 - 10 - 1$).

(b) What reciprocal plays the same role base 8? Prove it.

Just for fun (no credit given), solve the crossword puzzle on the back of this page and explain all of the “theme” words and the squares that are circled.

Crossword

Edited by Will Shortz

PUZZLE BY JONAH KAGAN

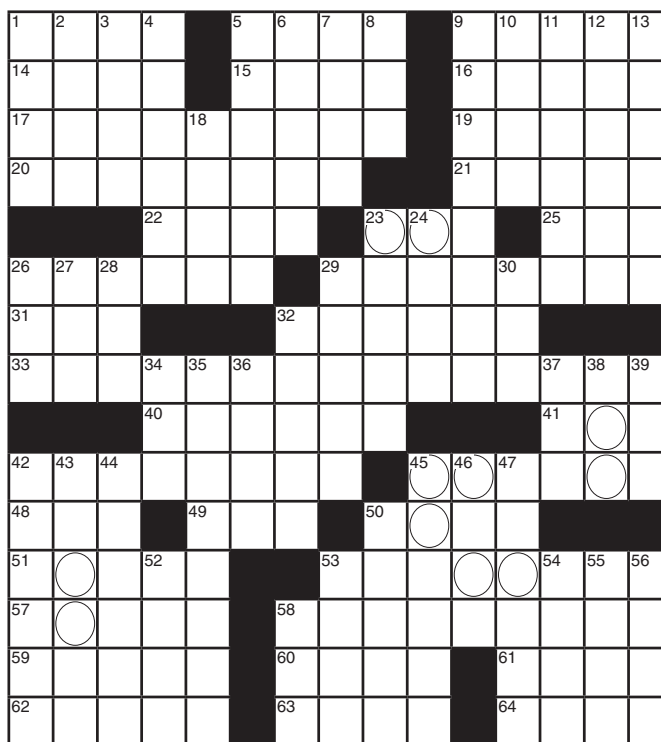
When this puzzle is done, the 11 circled letters can be connected by a curved line to spell a two-word phrase appropriate to this puzzle's theme.

ACROSS

- 1 Pipe part
 5 Babycakes
 9 Paper orders
 14 Leonardo of ____ (mathematician who wrote about the 33-Across)
 15 Out of kilter
 16 Have dinner at home
 17 Food with a heart
 19 Blue-collar worker
 20 Popular online lectures about "ideas worth spreading"
 21 Alvy's love interest in a Woody Allen film
 22 Father-and-daughter boxers
 23 Pres., e.g.
 25 ____ Lingus
 26 Midsize Kia
 29 Cephalopod known for its shell
 31 "Now I see!"
 32 "Both work for me"
 33 Mathematical sequence related to a pattern found in a 17-, 29-, 42- or 58-Across, informally
- 40 Sneeze producer
 41 Cam button
 42 Cochlea locale
 45 Honolulu's ____ Palace
 48 "____ man walks into a bar ..."
 49 No. after a no.
 50 Razor brand
 51 Sayings of Jesus
 53 No longer able to shoot
 57 Some waffles
 58 Van Gogh subject
 59 Link with
 60 Sauce that's made "Old World Style"
 61 Singer Bareilles with the 2007 top 10 hit "Love Song"
 62 26-Across, e.g.
 63 Yemeni port
 64 Ship-to-ship communication

DOWN

- 1 Short row
 2 Ring around a rim
 3 Cornerstone abbr.
 4 Tiki bar staple
 5 "The Black ____" (2006 film)



5/11/11 (No. 0511)

ANSWER TO PREVIOUS PUZZLE

A	B	S		L	O	P	E	D		S	T	A	T	S
B	R	A		A	R	E	N	A		L	E	T	A	T
B	A	L	L	P	O	I	N	T		R	A	S	T	A
A	S	S	E	S		U	I	E		M	E	A	N	
S	H	A	H		P	O	I	N	T	G	U	A	R	D
		B	A	A	E	D		G	E	O	S			
G	U	A	R	D	D	O	G			T	A	B	O	O
A	N	N		H	E	R	E	T	I	C		L	T	D
L	I	D	E	E		D	O	G	H	O	U	S	E	
		A	R	C	H		W	E	A	R	E			
H	O	U	S	E	P	A	I	N	T		A	J	A	R
E	N	N	E		U	R	N			A	L	E	R	O
E	L	I	S	E		P	A	I	N	T	B	A	L	L
L	O	T	U	S			O	W	L	E	T		N	E
S	W	E	P	T		N	E	E	D	Y		S	S	S

- 6 They thought C-3PO was a god in "Return of the Jedi"
 7 Scroll storers
 8 Pumpernickel grain
 9 Badinage
 10 Merit
 11 Like much Schoenberg music
 12 Surroundings
 13 Mocking looks
 18 Pacify
 23 Homo sapiens, e.g.
 24 Stupidity syllables
 26 Speaker of stupid syllables
 27 Greek letter associated with the 33-Across
 28 Web browser subwindow
 29 More pleasant
 30 Like oddly conjugated verbs: Abbr.
 32 Razzle-dazzle
 34 Unbarred, to a bard
 35 "Because I felt like it"
 36 "A Clockwork Orange" narrator
 37 Glass behind a radio microphone
 38 Night of poetry
 39 Chem. or biol.
 42 They may start as sandbars
 43 Knuckle-head move?
 44 Pestored
 45 "You'll enjoy this"
 46 Said aloud
 47 Old-time crooner Julius
 50 N.B.A. player/manager Danny
 52 Itsy-bitsy bit
 53 Pair
 54 Sound of an air kiss
 55 Architect Saarinen
 56 Heavy cart
 58 Miguel's Mrs.

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