Homework 6

CS 5315 (Theory of Computation)

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2. Describe a Turing Machine to compute π_2^3.

Assuming: R - goes right, L - goes left.

(start, #)	$\longrightarrow$	(mark, 1)
(mark, 1)	$\longrightarrow$	(firstnum, R)
(firstnum, 1)	$\longrightarrow$	(erase_firstnum, #)
(erase_firstnum, #)	$\longrightarrow$	(firstnum, R)
(firstnum, #)	$\longrightarrow$	(secondnum, R)
(secondnum, 1)	$\longrightarrow$	(secondnum, R)
(secondnum, #)	$\longrightarrow$	(thirdnum, R)
(thirdnum, 1)	$\longrightarrow$	(erase_thirdnum, #)
(erase_thirdnum, #)	$\longrightarrow$	(thirdnum, R)
(thirdnum, #	$\longrightarrow$	(rewind, L)
(rewind, #)	$\longrightarrow$	(rewind, L)
(rewind, 1)	$\longrightarrow$	(erase_secondnum, #)
(erase_secondnum, #)	$\longrightarrow$	(move_secondnum, L)
(move_secondnum, 1)	$\longrightarrow$	(move_secondnum, L)
(move_secondnum, #)	$\longrightarrow$	(check_left, L)
(check_left, #)	$\longrightarrow$	(forward, R)
(forward, #)	$\longrightarrow$	(add_secondnum, 1)
(add_secondnum, 1)	$\longrightarrow$	(forward_end, R)
(forward_end, 1)	$\longrightarrow$	(forward_end, R)
(forward_end, #)	$\longrightarrow$	(rewind, L)
(check_left, 1)	$\longrightarrow$	(advance, R)
(advance, #)	$\longrightarrow$	(add_last, 1)
(add_last, 1)	$\longrightarrow$	(back_start, L)
(back_start, 1)	$\longrightarrow$	(done, #)
(done, #)	$\longrightarrow$	**halt**

- Example to ilustrate the Turing Machine for π_2^3.

Input:

#	1	1	#	1	1	1	#	1	#

Output:

#	1	1	1	#	#	#	#	#	#

#	1	1	#	1	1	1	#	1	#

1	1	1	#	1	1	1	#	1	#
1	**1**	1	#	1	1	1	#	1	#
1	**#**	1	#	1	1	1	#	1	#
1	#	**1**	#	1	1	1	#	1	#
1	#	**#**	#	1	1	1	#	1	#
1	#	#	**#**	1	1	1	#	1	#
1	#	#	#	**1**	1	1	#	1	#
1	#	#	#	1	**1**	1	#	1	#
1	#	#	#	1	1	**1**	#	1	#
1	#	#	#	1	1	1	**#**	1	#
1	#	#	#	1	1	1	#	**1**	#
1	#	#	#	1	1	1	#	**#**	#
1	#	#	#	1	1	1	#	#	**#**
1	#	#	#	1	1	1	#	**#**	#
1	#	#	#	1	1	1	**#**	#	#
1	#	#	#	1	1	**1**	#	#	#
1	#	#	#	1	1	**#**	#	#	#
1	#	#	#	1	**1**	#	#	#	#
1	#	#	#	**1**	1	#	#	#	#
1	#	#	**#**	1	1	#	#	#	#
1	#	**#**	#	1	1	#	#	#	#
1	#	#	**#**	1	1	#	#	#	#

1	#	#	**1**	1	1	#	#	#	#
1	#	#	1	**1**	1	#	#	#	#
1	#	#	1	1	**1**	#	#	#	#
1	#	#	1	1	1	**#**	#	#	#
1	#	#	1	1	**1**	#	#	#	#
1	#	#	1	1	**#**	#	#	#	#
1	#	#	1	**1**	#	#	#	#	#
1	#	#	**1**	1	#	#	#	#	#
1	#	**#**	1	1	#	#	#	#	#
1	**#**	#	1	1	#	#	#	#	#
1	#	**#**	1	1	#	#	#	#	#
1	#	**1**	1	1	#	#	#	#	#
1	#	1	**1**	1	#	#	#	#	#
1	#	1	1	**1**	#	#	#	#	#
1	#	1	1	1	**#**	#	#	#	#
1	#	1	1	**1**	#	#	#	#	#
1	#	1	1	**#**	#	#	#	#	#
1	#	1	**1**	#	#	#	#	#	#
1	#	**1**	1	#	#	#	#	#	#
1	**#**	1	1	#	#	#	#	#	#
1	#	1	1	#	#	#	#	#	#
1	**#**	1	1	#	#	#	#	#	#
1	**1**	1	1	#	#	#	#	#	#
1	1	1	1	#	#	#	#	#	#
#	1	1	1	#	#	#	#	#	#