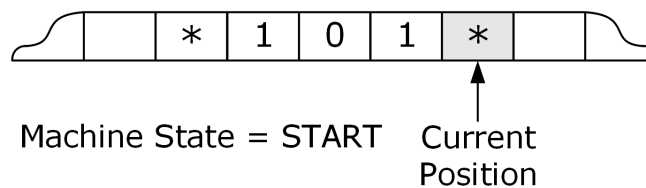


# Fundamentals of Computer Science

## Homework Set 10

December 27, 2023

1. (10') Consider the **Turing machine** described in the figure, starting with the following initial status. Please write the status of each step until the machine halts. Note that a status of a Turing machine should contain contents on the tape, where the current position is and what the machine state is.



Current state	Current cell content	Value to write	Direction to move	New state to enter
START	*	*	Left	ADD
ADD	0	1	Right	RETURN
ADD	1	0	Left	CARRY
ADD	*	*	Right	HALT
CARRY	0	1	Right	RETURN
CARRY	1	0	Left	CARRY
CARRY	*	1	Left	OVERFLOW
OVERFLOW	*	*	Right	RETURN
RETURN	0	0	Right	RETURN
RETURN	1	1	Right	RETURN
RETURN	*	*	No move	HALT

The **current state** is indicated by uppercase letters. We use the "<" symbol to represent the pointer, which points to the character on the left.

This is an example with the initial state “\*0\*<”.

Example	Current content	Current state
STEP 1	*0*<	START
STEP 2	*0<*	ADD
STEP 3	*1*<	RETURN
STEP 4	*1*<	HALT

Write your answer below.

Your Answer	Current content	Current state
STEP 1	*101*<	START
STEP 2	*101<*	ADD
STEP 3	*10<0*	CARRY
STEP 4	*110<*	RETURN
STEP 5	*110*<	RETURN
STEP 6	*110*<	HALT

END.