COMP 455
Models of Languages and Computation
Fall 2021
Homework 8
Due Thursday, November 18, 2021

1. Consider the Turing machine $M = (K, \Sigma, \delta, s, H)$ where $K = \{q_0, q, s, t, h\}, \Sigma = \{\sqcup, \triangleright, a, b, c\}, s = q_0, H = \{h\}$, and δ includes the following transitions:

$\delta(q_0, \sqcup)$	$=$	$(q, \rightarrow)$
$\delta(q, a)$	$=$	$(q, \rightarrow)$
$\delta(q, b)$	$=$	$(q, \rightarrow)$
$\delta(q, c)$	$=$	$(q, \rightarrow)$
$\delta(q, \sqcup)$	$=$	$(s, \leftarrow)$
$\delta(s, a)$	$=$	(t, c)
$\delta(s, b)$	$=$	(t, a)
$\delta(s, c)$	$=$	(t, b)
$\delta(s, \sqcup)$	$=$	$(h, \sqcup)$
$\delta(t, a)$	$=$	$(s, \leftarrow)$
$\delta(t, b)$	$=$	$(s, \leftarrow)$
$\delta(t, c)$	$=$	$(s, \leftarrow)$

There may be other transitions besides these, but these are all you need to know. The symbol $\sqcup$ denotes a blank.

a) What is the final tape configuration when this machine is started on the tape $\triangleright \sqcup abbacbca$ scanning the blank in the start state?

b) Describe informally what this machine does.

For this homework you may work in groups of up to four people and groups are encouraged to turn in only one paper with everyone's names in the group on it. This will make the work of the grader easier.