Exercises for Computability and Complexity, Spring 2019, Sheet 4 – Solutions

Please return on Tuesday March 5 in class. As usual you are invited but not requested to work in teams of size at most 2.

Exercise 1 Consider the set T of all single-tape TMs with tape alphabet $\Sigma = \{0, 1, \sqcup, \triangleright\}$. Design a coding scheme by which every TM M in T becomes coded by a codeword $<M> \in \{0, 1, \#\}^*$. Describe your coding scheme in formal notation and use it to encode the the ultra-simple TM M with tape alphabet $\Sigma = \{0, 1, \sqcup, \triangleright\}$ and states $\{s, yes, no\}$ that has the following transition table:

$p \in K$	$\sigma \in \Sigma$	$\delta(q, \sigma)$
s	0	$(yes, 0, -)$
s	1	$(s, 1, \rightarrow)$
s	$\sqcup$	$(no, \sqcup, -)$
s	$\triangleright$	$(s, \triangleright, \rightarrow)$