

CPSC 351 — Tutorial Exercise #13

Many-One Reductions I

This question is intended to give you practice in establishing **many-one reductions** between languages. It is of the difficulty, and length, that would be appropriate for a question on an **assignment** in CPSC 351.

Problem To Be Solved

1. Let $\text{Reject}_{\text{TM}} \subseteq \text{TM+I} \subseteq \Sigma_{\text{TM}}^*$ be the set of encodings of Turing machines

$$M = (Q, \Sigma, \Gamma, \delta, q_0, q_{\text{accept}}, q_{\text{reject}})$$

and strings $\omega \in \Sigma^*$ such that M **rejects** ω .

Use a **many-one reduction** to prove that the language $\text{Reject}_{\text{TM}}$ is undecidable.

A **hint** for this problem is available in a separate file — but you should spend at least a little bit of time trying to solve this problem, without looking at it, before you use this hint.