Problem numbers are from the second edition of Sipser’s book. If unsure about which problem to solve, ask.

1. Give an implementation-level description and a formal description (i.e. including the state diagram of the transition function) of a TM that recognizes

\[ \{u\#v : u, v \in \{0,1\}^* \text{ and } u \text{ is } v \text{ reversed} \} \]

2. * Show that a language is decidable iff there is an enumerator that prints it out in lexicographic order.

3. 3.15 d e

4. (extra credit) 3.16 b d

5. Prove that the union of countably many countable sets is countable.

6. (extra credit) * 3.13

7. (extra credit) * 4.17

8. 4.18

9. * 4.28