Tutorial 11

- You may benefit from solving the problems on your own or in collaboration with others rather than reading solutions given in books or sources online.

- For the sake of getting better at solving problems, start writing down your thoughts and go over them repeatedly, even if you do not get the full solution.

- No credit is attached to solving this tutorial. However, solving these problems may help in being able to perform better in quizzes and exams which count towards the overall credits.

1. Categorize the following problems into one of the three categories: (i) decidable, (ii) undecidable but recognizable, (iii) not recognizable. Justify your answers.

    (a) $\{\ M \mid L(M)$ contains at least two strings$\}$.

    (b) $\{\ M \mid L(M)$ is infinite$\}$.

    (c) $\{\ M \mid L(M)$ is context-free$\}$.

    (d) $\{M \mid M$ starts with a blank tape and writes at least one non-blank symbol$\}$.

    (e) $\{(M_1, M_2) \mid L(M_1) \cap L(M_2) = \emptyset\}$.

    (f) $\{M \mid M$ halts on all inputs$\}$.

    (g) $\{M \mid L(M)$ is regular$\}$