Week 11 Tutorial Session

(1) Show that the following languages are decidable.

    (a) $L_1 = \{\langle R \rangle \mid R$ generates at least one string w that has $\texttt{111}$ as a substring$\}$
        Here R is a regular expression over alphabet $\{\texttt{0},\texttt{1}\}$.

    (b) $E_{\text{CFG}} = \{\langle G \rangle \mid$ Context-free grammar G generates no strings $(L(G) = \emptyset)\}$

(2) For each of these languages, say whether it is decidable. Justify your answer.

    (a) $L_1 = \{\langle M, w, t \rangle \mid$ Turing machine M accepts w within t transitions$\}$

    (b) $L_2 = \{\langle M \rangle \mid$ Turing machine M recognizes strings of odd length$\}$
        Recall that a Turing machine M recognizes a language L if M accepts all strings in
        L and nothing else.