Prove that the following languages are undecidable *using Rice's Theorem*:

Rice's Theorem. *Let* $\mathcal{X}$ *be any nonempty proper subset of the set of acceptable languages. The language* $\textsc{AcceptIn}\mathcal{X} := \left\{\langle M\rangle \mid \textsc{Accept}(M) \in \mathcal{X}\right\}$ *is undecidable.*

1. $\textsc{AcceptRegular} := \left\{\langle M\rangle \mid \textsc{Accept}(M) \text{ is regular}\right\}$
2. $\textsc{AcceptIllini} := \left\{\langle M\rangle \mid M \text{ accepts the string } \texttt{ILLINI}\right\}$
3. $\textsc{AcceptPalindrome} := \left\{\langle M\rangle \mid M \text{ accepts at least one palindrome}\right\}$
4. $\textsc{AcceptThree} := \left\{\langle M\rangle \mid M \text{ accepts exactly three strings}\right\}$
5. $\textsc{AcceptUndecidable} := \left\{\langle M\rangle \mid \textsc{Accept}(M) \text{ is undecidable}\right\}$

To think about later. Which of the following languages are undecidable? How do you prove it?

1. $\textsc{Accept}\{\{\varepsilon\}\} := \left\{\langle M\rangle \mid M \text{ only accepts the string } \varepsilon, \text{ i.e. } \textsc{Accept}(M) = \{\varepsilon\}\right\}$
2. $\textsc{Accept}\{\varnothing\} := \left\{\langle M\rangle \mid M \text{ does not accept any strings, i.e. } \textsc{Accept}(M) = \varnothing\right\}$
3. $\textsc{Accept}\varnothing := \left\{\langle M\rangle \mid \textsc{Accept}(M) \text{ is not an acceptable language}\right\}$
4. $\textsc{Accept}{=}\textsc{Reject} := \left\{\langle M\rangle \mid \textsc{Accept}(M) = \textsc{Reject}(M)\right\}$
5. $\textsc{Accept}{\neq}\textsc{Reject} := \left\{\langle M\rangle \mid \textsc{Accept}(M) \neq \textsc{Reject}(M)\right\}$
6. $\textsc{Accept}{\cup}\textsc{Reject} := \left\{\langle M\rangle \mid \textsc{Accept}(M) \cup \textsc{Reject}(M) = \Sigma^*\right\}$