1. Given a list of $n$ numbers, design an algorithm that determines whether this list contains any duplicates. What is the (asymptotic) running time of your algorithm in terms of $n$? (You may ignore the encoding length of numbers)

2. Given a list of $n$ numbers, design an algorithm to find and print all numbers which are duplicates in the list. What is the asymptotic running time of your algorithm in terms of $n$? (You may ignore the encoding length of individual numbers) What makes this different from Problem 1? Does it necessarily affect the running time?

3. If $A \leq_{p} B$ and $B$ is a regular language, does that imply that $A$ is also a regular language? Prove why or give an example why not.

4. Let $T = \{ \langle M \rangle : M$ is a $TM$ that accepts $w$ whenever it accepts $w^R \}$. Show that $T$ is undecidable.

5. Show that $P$ is closed under union, concatenation, and complement.

6. Show that $CONNECTED = \{ \langle G \rangle : G$ is an undirected and connected graph} is in $P$. 