1. Let $B \subseteq \Sigma^*$ be a decidable set. For each $y \in \Sigma^*$ let

$$B_y = \{x \in \Sigma^* \mid (x, y) \in B\}$$

Show that there is a decidable language $C \subseteq \Sigma^*$ such that $C \neq B_y$ for all $y \in \Sigma^*$. 
2. Let

\[ A = \{ \langle M \rangle : M \text{ is a TM and } \mathcal{L}(M) \text{ has at least two strings} \} \]

Is \( A \) semidecidable? Is \( \overline{A} \) semidecidable?

Justify your answers.

DO NOT USE RICE’S THEOREM.

(You may continue your solution on the next page.)
(Continue your solution to Question 2 here.)
3. Prove that every infinite semidecidable set has an infinite decidable subset.

Hint: Consider enumerators.