1. State the definition of:

(a) the language $S_{tm}$
   $$S_{tm} = \{ <M> : TM \text{ does not accept } <M> \}$$

(b) the language $A_{tm}$
   $$A_{tm} = \{ <M,w> : TM \text{ accepts string } w \}$$

2. In each case give an example, or state it does not exist:

(a) A language that is recursive.
   e.g. palindrome

(b) A language that is r.e.
   e.g. palindrome

(c) A language that is recursive but not r.e.
   $\underline{DNE}$

(d) A language that is r.e. but not recursive.
   $A_{tm}$

(e) A language that is not recursive but its complement is.
   $\underline{DNE}$

(f) A language that is not r.e. but its complement is.
   $S_{tm}$