1. We define C as:

   $C = A \cap B$

   We can map all the elements in A to those in $A \cap B as A \cap B \subseteq A$.

   Also we can map all elements in B to those in $A \cap B as A \cap B \subseteq B$.

   Hence we have that

   $A \leq_m C, and$

   $B \leq_m C$

   Also B is minimal as for any other set D such that $A \leq_m D \& B \leq_m D, C \subseteq D$.

   Hence$C \leq_m D$

4. No. For example, the languages A =$0^n 1^n | n >= 0 and B = 1$,

   both over the alphabet $= sum(0, 1)$

   f(w) =1 if w belongs to A;

   0 if w does not belong to A:

   Observe that A is a context-free language, so it is also Turing-decidable. Thus, f is a compatible function. Also, w belongs A if and only if f(w) = 1, which is true if and only if f(w) belongs to B. Hence, A ¡=m B. Language A is non regular, but B is regular since it is finite.