

For any two languages A and B, a language J exists, where  $A \leq_T J$  and  $B \leq_T J$ . It can be proved as follows:

Two languages A and B are given and one more language J exists to find Turing reducibility between A and J and between B and J. it can be proved by using the concept of mapping reducibility.

$A \leq_T J$  means that A is Turing reducible to language J.  $B \leq_T J$  means that B is Turing reducible to J. Now, use the concept of decidability. Here J is an intermediate language that is being used to prove the Turing reducibility of A and B. So prove first of all decidability of J must be proved.

Decidability of J can be proved by the given relation  $B \leq_T J$  and  $A \leq_T J$  if A and B are decidable then J will also be decidable. Replace the oracle Turing machine that decides A by an ordinary Turing Machine that decides A

Turing reducibility is the generalized form of mapping reducibility. Mapping reducibility holds true only if decidability holds true because the mapping reducibility may be used to give an oracle Turing Machine that decide Turing reducibility of A and B on the Basis of J.