```
theory Test
  imports Example_Lomuto
begin

context
  fixes xsi :: "('a::{linorder,heap}) cell ref"
begin

synth_definition swap_impl is [hnr_rule_diff_arr]:
  "hnr
    (master_assn' (insert (xs, xsi) F) * id_assn i ii * id_assn j ji)
    (□:: ?'a Heap)
    ?Γ'
    (swap_opt i j xs)"
  unfolding swap_opt_def
  by hnr_diff_arr

synth_definition partition_impl is [hnr_rule_diff_arr]:
  "hnr
    (master_assn' (insert (xs, xsi) F) * id_assn i ii * id_assn j ji)
    (□:: ?'a Heap)
    ?Γ'
    (partition_opt (i, j, xs))"
  unfolding partition_opt_def
  apply(hnr_recursion
          "(λF p pi.
                master_assn' (insert (snd(snd p), snd (snd pi)) F) *
                id_assn (fst p) (fst pi) *
                id_assn (fst (snd p)) (fst (snd pi)))"
          "(λF p pi r ri.
                master_assn' (insert (snd(snd p), snd (snd pi))
                              (insert (fst r, fst ri) F)) *
                id_assn (snd r) (snd ri) *
                id_assn (fst p) (fst pi) *
                id_assn (fst (snd p)) (fst (snd pi)) *
                true
                )"
          hnr_diff_arr_match_atom
        )
  by hnr_diff_arr

end

end
```