

KnotSort@l\_List :=

  KnotSort@l = Sort[l, If[Length@#1 == Length@#2,  
    If[#1 === Abs /@ #1,  
      #2 != Abs /@ #2  $\vee$  Order[#1, #2] == 1,  
      #2 != Abs /@ #2  $\wedge$  Order[#1, #2] == 1],  
    Length@#1 < Length@#2] &];