```mathematica
ToPD@k_MD := ToPD@k =
  Block[{a = Abs /@ k, n = Length@k, o, r},
    o = Ordering@a;
    Do[If[PlanarGraphQ@Graph[Join @@ Table[
          Array[{v, # - 1} ⇝ {v, #} &, 3] ⋃
            {{v, 0} ⇝ {v, 3}} ⋃
            Join @@ ({{v, #⟦1⟧} ⇝ {#⟦2⟧,
                  #⟦1⟧ + (1 - c⟦v⟧ c⟦#⟦2⟧⟧) / 2},
                {v, 3 - #⟦1⟧} ⇝ {#⟦2⟧,
                  #⟦1⟧ + (1 + c⟦v⟧ c⟦#⟦2⟧⟧) / 2}} &
                /@ ({#, o⟦Mod[v - # / 2, n, 1]⟧} & /@
                  {0, 2})),
          {v, n}]],
      (*The crossing assignment
       c is a valid assignment.*)
      r =
       c;
      Break[]], {c, Tuples[{1, -1}, n]}];
    PD @@ (X### & @@@ Array[
        {2 # - 1, 2 a⟦#⟧, 2 #, Mod[2 a⟦#⟧ + 1, 2 n, 1]}
          ⟦If[Sign@k⟦#⟧ == 1, ;; , {2, 3, 4, 1}]⟧
          ⟦If[r⟦#⟧ == 1, ;; , {1, 4, 3, 2}]⟧ &, n])];
```