1. Consider the four-bar linkage shown below.

   a) Generate the two cognates of this mechanism.

   b) Create a Watt I parallel motion generator from the base linkage and one of the cognates
   you generate in part a.

   Note, you are welcome to use a different base linkage for the cognate constructions if you wish
   (for example, you may want to pick a wheelchair lift or a mechanism related to your project).

2. Consider the following set of four precision positions for motion generation (note, \( \theta_j \) is the
   angle of the coupler at each precision position). Again, if you wish to pick a different 4PP
   motion generation problem related to your project, you are welcome to do so.

   \[
   \begin{array}{ccc}
   \text{Prec Pos (j)} & x_j & y_j & \theta_j \\
   1 & 23.34 & 3.39 & 0.0^\circ \\
   2 & 20.55 & 7.67 & -47.1^\circ \\
   3 & 20.01 & 12.34 & -113.1^\circ \\
   4 & 20.38 & 13.88 & -136.1^\circ \\
   \end{array}
   \]

   a) Determine the compatibility linkage defined by these precision positions (i.e., specify
   vectors \( \vec{\Delta}_1, \vec{\Delta}_2, \vec{\Delta}_3, \) and \( \vec{\Delta}_4 \)).

   b) Calculate the \((x,y)\) coordinates of the ground and moving pivots corresponding to a free
   choice of: \( \beta_2 = 20^\circ \).

   c) Consider the slider point associated with this set of precision positions.
      i. What are the \((x,y)\) coordinates of the moving pivot associated with the slider point?
      ii. What is the direction of sliding?
      iii. What is the distance the slider translates between precision position 1 and the
           remaining three precision positions?