$$a := 7 \qquad b := 4 \qquad c := 5 \qquad d := 6 \qquad x := \frac{85 \cdot \pi}{180}$$

$$H := \frac{d}{a}$$

$$I := \frac{d}{c}$$

$$K := \frac{d}{b}$$

$$J := \frac{\left(a^2 - b^2 + c^2 + d^2\right)}{2 \cdot a \cdot c} \qquad L := \frac{\left[\left(c^2 - d^2\right) - a^2 - b^2\right]}{2 \cdot a \cdot b}$$

$$A := \cos(x) - H - (I \cdot \cos(x)) + J$$

$$B := -2\sin(x)$$

$$C := H - (I + 1) \cdot \cos(x) + J$$
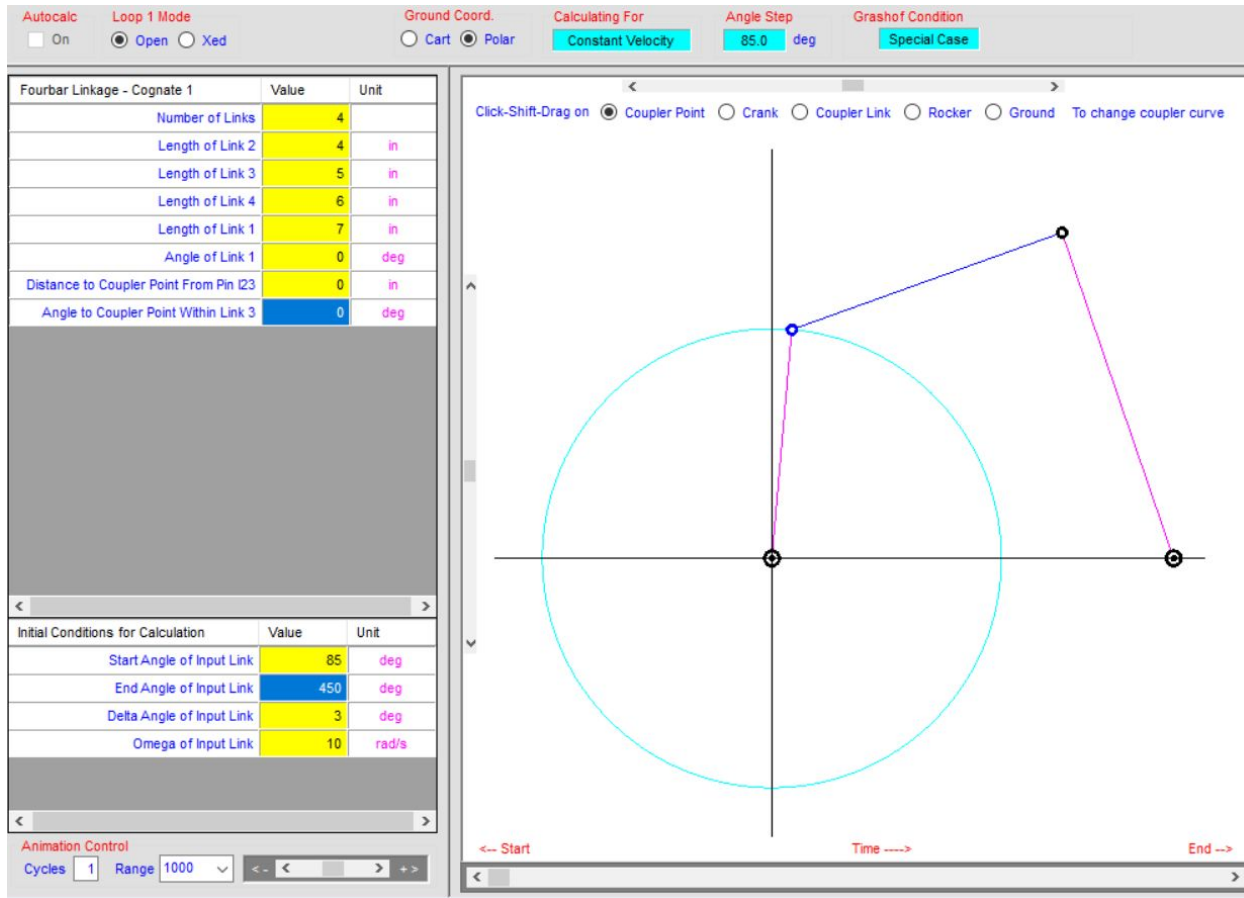
$$D := \cos(x) - H + K \cdot \cos(x) + L$$

$$E := -2\sin(x)$$

$$F := H + (K - 1) \cdot \cos(x) + L$$

$$y := 2 \cdot \operatorname{atan}\left(\frac{-E + \sqrt{E^2 - 4DF}}{2 \cdot D}\right) \qquad w := 2 \cdot \operatorname{atan}\left[\frac{\left(-E - \sqrt{E^2 - 4 \cdot D \cdot F}\right)}{2 \cdot D}\right]$$
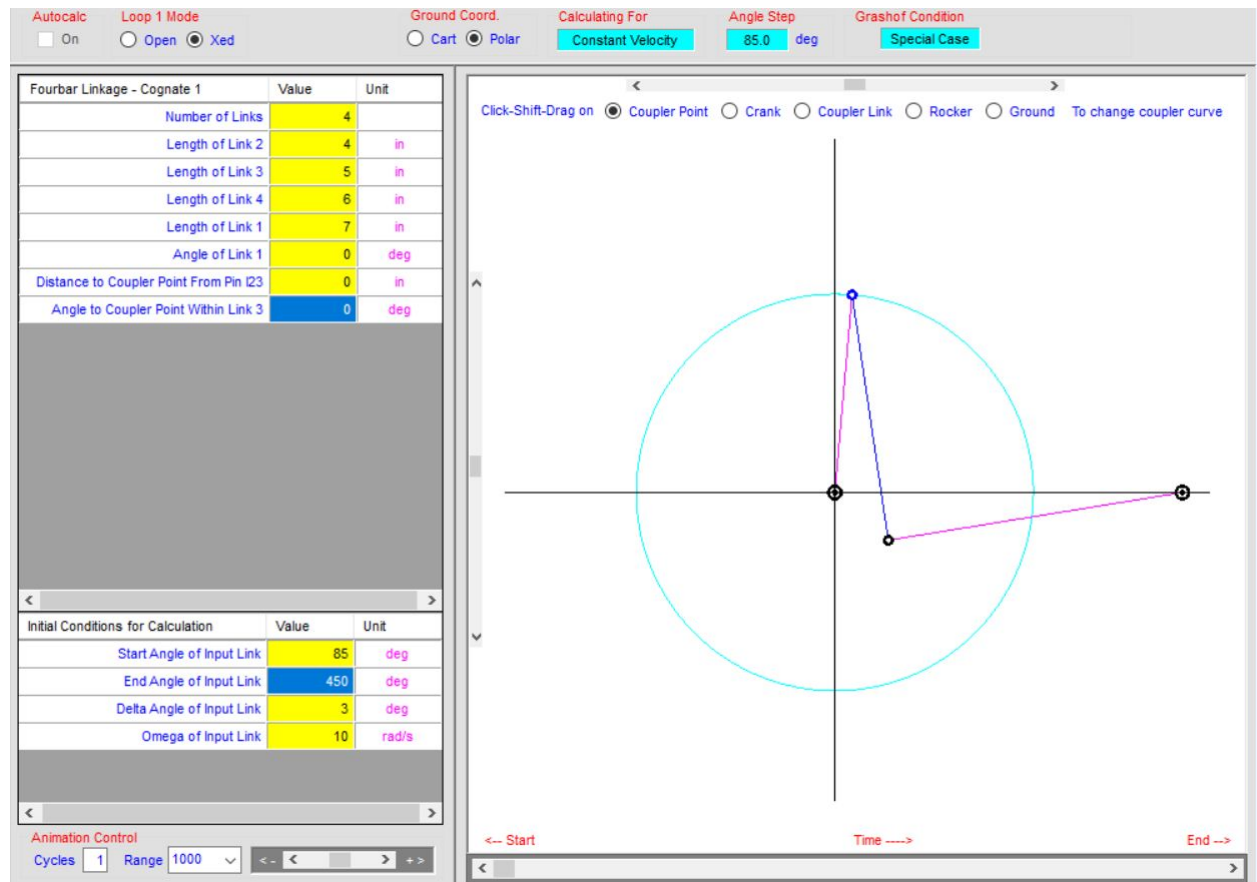
$$q := 2 \cdot \operatorname{atan}\left(\frac{-B + \sqrt{B^2 - 4 \cdot A \cdot C}}{2 \cdot A}\right) \qquad z := 2 \cdot \operatorname{atan}\left[\frac{\left(-B - \sqrt{B^2 - 4 \cdot A \cdot C}\right)}{2 \cdot A}\right]$$

$$y = -1.141 \qquad w = -0.684 \qquad q = 2.411 \qquad z = 2.047$$

Fourbar Linkage - Cognate 1	Value	Unit
Number of Links	4	
Length of Link 2	4	in
Length of Link 3	5	in
Length of Link 4	6	in
Length of Link 1	7	in
Angle of Link 1	0	deg
Distance to Coupler Point From Pin I23	0	in
Angle to Coupler Point Within Link 3	0	deg

Click-Shift-Drag on ◉ Coupler Point ○ Crank ○ Coupler Link ○ Rocker ○ Ground   To change coupler curve

Initial Conditions for Calculation	Value	Unit
Start Angle of Input Link	85	deg
End Angle of Input Link	450	deg
Delta Angle of Input Link	3	deg
Omega of Input Link	10	rad/s

Animation Control
Cycles 1 Range 1000

<-- Start   Time ---->   End -->

Input Angle (deg)	Theta2 Ang (deg)	Theta3 Ang (deg)	Theta4 Ang (deg)	Trans Ang Ang (deg)
85.000	85.000	19.766	108.925	89.159
88.000	88.000	18.815	110.769	88.046
91.000	91.000	17.906	112.664	85.242
94.000	94.000	17.036	114.608	82.428
97.000	97.000	16.201	116.594	79.606
100.000	100.000	15.398	118.621	76.777

Fourbar Linkage - Cognate 1	Value	Unit
Number of Links	4	
Length of Link 2	4	in
Length of Link 3	5	in
Length of Link 4	6	in
Length of Link 1	7	in
Angle of Link 1	0	deg
Distance to Coupler Point From Pin I23	0	in
Angle to Coupler Point Within Link 3	0	deg

Initial Conditions for Calculation	Value	Unit
Start Angle of Input Link	85	deg
End Angle of Input Link	450	deg
Delta Angle of Input Link	3	deg
Omega of Input Link	10	rad/s

Animation Control
Cycles 1 Range 1000

Autocalc Loop 1 Mode   Ground Coord.   Calculating For   Angle Step   Grashof Condition
On Open Xed   Cart Polar   Constant Velocity   85.0 deg   Special Case

Click-Shift-Drag on ⊙ Coupler Point ○ Crank ○ Coupler Link ○ Rocker ○ Ground To change coupler curve

<-- Start   Time ---->   End -->

Input Angle (deg)	Theta2 Ang (deg)	Theta3 Ang (deg)	Theta4 Ang (deg)	Trans Ang Ang (deg)
85.000	85.000	278.383	189.224	89.159
88.000	88.000	280.726	188.773	88.046
91.000	91.000	283.100	188.342	85.242
94.000	94.000	285.503	187.931	82.428
97.000	97.000	287.931	187.537	79.606

1c) Is the fourbar linkage Grashof?

7+4 <= 6 +5
11 <= 11
This is true, so the fourbar linkage is Grashof.

1d)