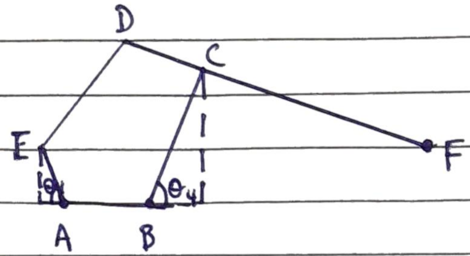

$$l_{DE} = \sqrt{(X_D - X_1)^2 + (Y_D + Y_1)^2} \quad ; \quad l_{CD} = \sqrt{(X_D - X_2)^2 + (Y_D - Y_2)^2} \quad \text{---} (1)$$

(x_1, y_1) are coordinates of E ; (X_2, Y_2) are coordinates of C

$$X_1 = -l_{AE} \cos\theta_1 \quad ; \quad X_2 = l_{AB} + l_{BC} \cos\theta_4$$
$$Y_1 = l_{AE} \sin\theta_1 \quad ; \quad Y_2 = l_{BC} \sin\theta_4 \quad \text{---} (2)$$

(1) $\Rightarrow$

$$(X_D - X_1)^2 + (Y_D + Y_1)^2 = l_{DE}^2 \text{ --- } (3) \; ; \; (X_D - X_2)^2 + (Y_D - Y_2)^2 = l_{CD}^2 \text{ --- } (4)$$

(3) $-$ (4) $\Rightarrow$

$$X_D(2X_2 - 2X_1) + Y_D(2Y_2 - 2Y_1) = l_{DE}^2 - l_{CD}^2 + X_2^2 - X_1^2 + Y_2^2 - Y_1^2$$

(3) $+$ (2) $\Rightarrow$

$$2X_D^2 + 2Y_D^2 - 2X_D(X_1 + X_2) - 2Y_D(Y_1 + Y_2) = l_{DE}^2 + l_{CD}^2 - X_1^2 - X_2^2 - Y_1^2 - Y_2^2$$

Except X and Y, all are known.
Solving in Matlab yields 2 solutions, one is invalid.
Once X and Y are known, sub in Section formula.

D, C, F lie in a straight line $\quad +y_2^2 = l_{DC}^2$

$$\therefore \frac{mF_x + nD_x}{m+n} = C_x \quad \left\{ \begin{array}{l} \text{Section} \\ \text{Formula} \end{array} \right\}$$

$$\frac{mF_y + nD_y}{m+n} = C_y$$

m = length of CD, n = length of CF

$$\Rightarrow \left. \begin{array}{l} l_{CD} X + l_{CF} x_1 = C_x (l_{CD} + l_{CF}) \\ l_{CD} Y + l_{CF} y_1 = C_y (l_{CD} + l_{CF}) \end{array} \right\} \text{— } 1$$

```
>> test3

theta1 =

   -5.1748


theta4 =

    0.9454


X =

    18


Y =

    4.0000

fx >>
```