Using a TI-83/84 for Orthogonal Trajectories

Lily Yen

December 1, 2016

To graph the family $y = k\ln(x)$, simply choose some values for k and graph each one. For example

$$\begin{aligned} Y_1 &= \ln(x), \\ Y_2 &= 2\ln(x), \\ Y_3 &= -3\ln(x). \end{aligned}$$

The orthogonal trajectories are given by $y = \pm\sqrt{-x^2\ln(x) + \frac{1}{2}x^2 + 2C}$. Again, choose some values for C. Due to the $\pm$, you have to graph both the $(+)$- and $(-)$-version. For example

To get, say, Y_4, press VARS Y-VARS 1:Function 4:Y_4

$$\begin{aligned} Y_4 &= \sqrt{-x^2\ln(x) + \tfrac{1}{2}x^2 + 2} \\ Y_5 &= -Y_4 \\ Y_6 &= \sqrt{-x^2\ln(x) + \tfrac{1}{2}x^2 + 20} \\ Y_7 &= -Y_6 \end{aligned}$$

If the angles do not look like 90°, you forgot to set ZOOM 5:ZSquare.