NMPDE's
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Lab 01: Scalar equations:

Given x_p, y_p, x_Q, y_Q, and R, find θ such that:

$$f(\theta) = \frac{x_P \sin\theta - y_P \cos\theta}{\sqrt{(R\cos\theta - x_P)^2 + (R\sin\theta - y_P)^2}} + \frac{x_Q \sin\theta - y_Q \cos\theta}{\sqrt{(R\cos\theta - x_Q)^2 + (R\sin\theta - y_Q)^2}} = 0.$$

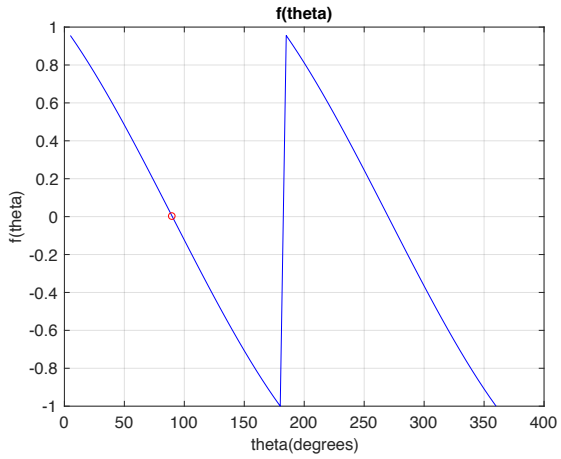
To accomplish this task a Bisection-Secant hybrid method has been applied. Ir has been programmed using the Matlab software (code is included in the zip file).

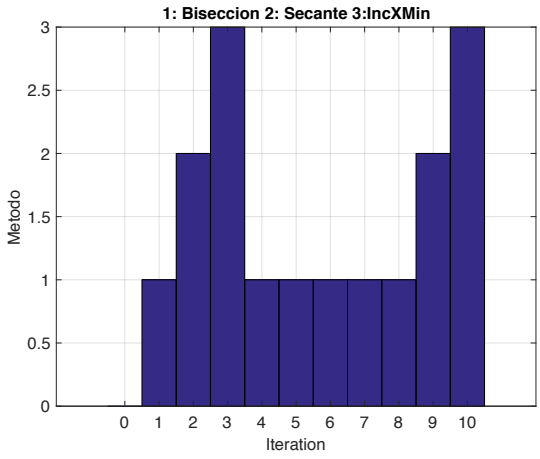
The following graphs show the iterations to achieve the solution for different values of x_p, y_p, x_Q, y_Q, and R.

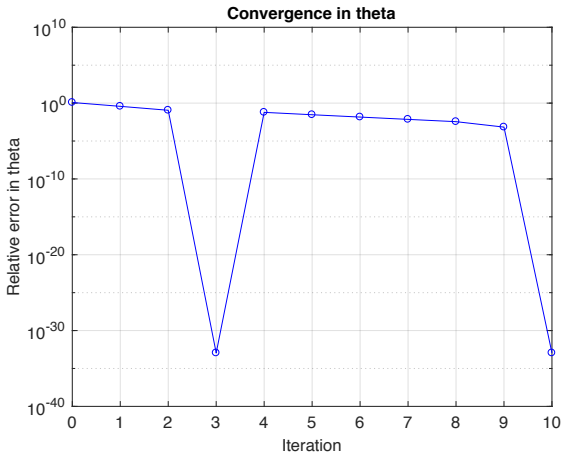
The tolerance considered has been 10e-5 in f and 10e-5 in θ. The minimum increment in θ considered in an interation is 10e-32.

The points x0 and b are the starting points, and they have been chosen so that f(x0)*f(b) < 0

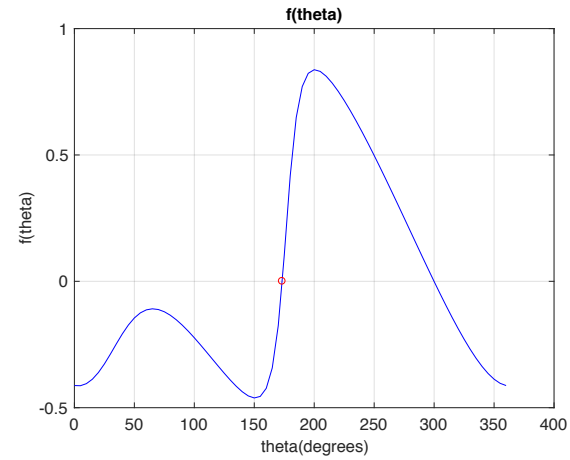
xp	yp	xq	yq	R	θ0 (º)	b (º)	θ (º)
1	0	-1	0	1	50	110	90

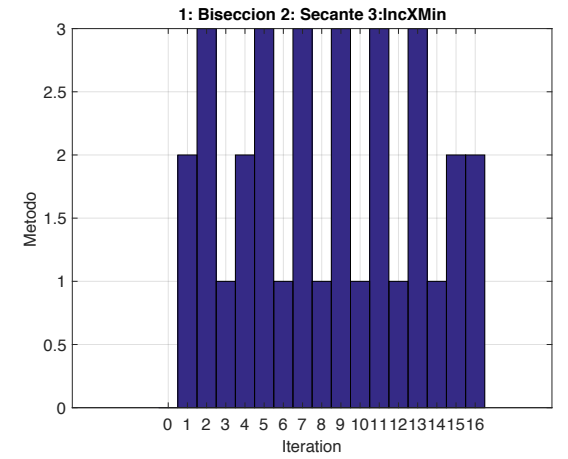


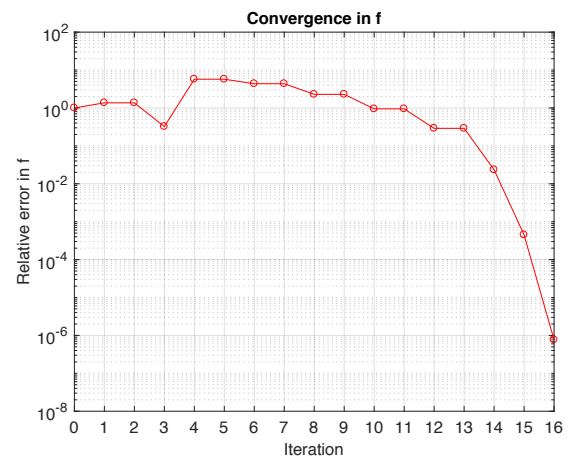


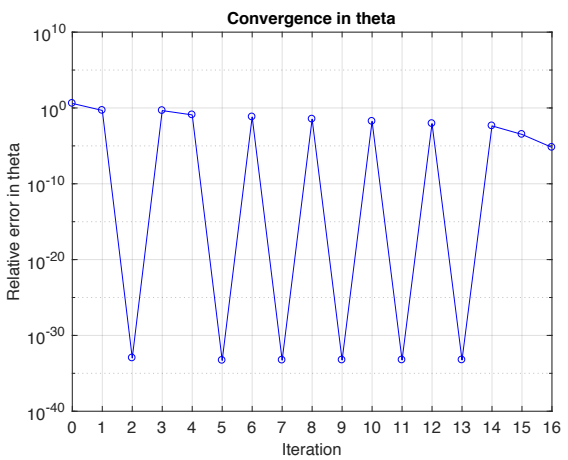


xp	yp	xq	yq	R	$\theta 0$ (º)	b (º)	θ (º)
0.4	0.25	-0.8	0.05	1	50	250	173.3502









xp	yp	xq	yq	R	$\theta 0$ (º)	b (º)	θ (º)
30	-45	10	6	120	50	250	140.1139