
1: The First Problem

I drew 100^2 points from the 2-dimensional Halton sequence, and counted the ratio of the points whose squared Euclidean norm is weakly less than 1. The estimated π is 3.1448.

2: The Second Problem

I have 100^2 quadrature points and use a Newton-Cortes method to get an approximation of π , which is 3.1016.

3: The Third Problem

Now I use the implicit function $y = \sqrt{1 - x^2}$ for the upper-right part of the unit circle.

4: The Fourth Problem

The estimate from the Nelder-Mead method for the NLS
is $\hat{\beta}_{NLS2} = (2.5126, -0.0384, 0.1141, -0.2796, 0.0676, -0.3698)$