Numerical Computing :: Project Three

The goal of this project is to study what "local" means for convergence of Newton's method. Consider the function

$$f(x) \;=\; \frac{1}{1+\exp(x)} \;-\; \frac{1}{2}, \qquad x \in [-5,5]. \tag{1}$$

The true root of this function is $r = 0$. You want to find an interval $[a, b]$ satisfying two criteria:

1. the length $b - a$ is as large as possible
2. Newton's method converges for any initial guess in the interval, $x_0 \in [a, b]$.

You'll determine the interval endpoints a and b using a computer experiment. Describe the rationale behind your choice of experiment, and report the results.