Numerical Analysis HW 2

This second HW is due to me via email by the evening of Sunday, February 11. As before, you should type it up as a well formed Jupyter Notebook including text, code and images produced by the code to clearly explain what's going on. You are explicitly permitted to talk about this HW with others. I can't imagine a better topic of conversation!

The problems

The function $f(x) = \sin(1/x)$ has infinitely many fixed points. We'd like to find the *largest* fixed point. Let's call it x_0.

1. Use Matplotlib to sketch a graph of f together with the line $y = x$ to get a rough idea as to the value of x_0.

2. Use fixed point iteration to find x_0 to near machine precision. How many iterates does this take?

3. How many iterates would you expect the bisection method to take?

4. Use Newton's method to find x_0. How many iterates does this take?

5. Suppose you start Newton's method from $x_0 = 0.1$. To what fixed point does the method converge?