1. Use the bisection method to find the root of \( x = e^{-x} \) with an accuracy of 0.0001. How many iterations does it take?

2. Use Newton’s method to find the root of \( x = e^{-x} \) with an accuracy of 0.0001. How many iterations does it take?

3. Consider applying Newton’s method to find the root \( \alpha = 0 \) of \( \sin x = 0 \). Find the order and the rate of convergence. Can you determine the interval of convergence?

4. Consider the sequence \( x_{n+1} = \cos(x_n), \ n = 0, 1, 2, \ldots \). How do the iterations behave? Does your answer depend on \( x_0 \)? Use a computer for hints and illustration.

5. (Extra credit) Consider applying Newton’s method to the equation \( x^2 + 1 = 0 \). Analyze possible outcomes for different choices of \( x_0 \). Use a computer for hints and illustration.