Numerical Lab #1

Name: Assem Saied Mohammed ID: 120210321

The question below matches Exercise 5 in the IPython notebook. Solve it and write your code and comments in the space provided in the notebook. You may search the Internet, ask your classmates, or ask the instructor for help. You may not ask the instructor for the answer. Do not copy the answer line by line from the Internet or from your classmates.

The quadratic formula states that the roots of $ax^2 + bx + c = 0$, when $a \neq 0$, are

$$x_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \text{ and } x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}.$$

Consider this formula applied to the equation $x^2 + 62.10x + 1 = 0$, assume the true roots are

$$x_1 = -0.01610723 \text{ and } x_2 = -62.08390.$$

Use four-digit rounding arithmetic in the calculations along with Python code to determine the root(s). Using the equation above for x_1, compute x_1 and find the relative error. State how and why to modify the equation for x_1 to obtain a better approximation. Mention the new relative error also.