

## PRACTICE WITH CLASSES AND OBJECTS

**Working with a partner/group, use the following steps to solve each of the following problems.**

- (a) Plan your code on the white board (either on the classroom wall or on Zoom).
- (b) *Only after you have planned your code should you type your code in Python.*
- (c) After you have typed your code, run multiple test cases. Does your code work? If not, how can you fix it?

Define a class to represent quadratic equation of the form  $y = ax^2 + bx + c$ . Note that such an equation can be specified by three real numbers  $a$ ,  $b$ , and  $c$ .

Here are some operations that one might want to do with quadratic equations. Create a method for each of these:

- **Evaluate at  $x$ :** Take a number  $x$  as a parameter and return the value of the quadratic evaluated at that number  $x$ .
- **Find the vertex:** The  $x$ -coordinate of the vertex is  $-\frac{b}{2a}$ .
- **Find the zeros:** The zeros are given by the quadratic formula,  $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ . Note that there could be 0, 1 or 2 zeros.
- **Determine whether two quadratics are equal:** Implement this as the `__eq__` method.
- **Text representation:** Implement the `__str__` method so that the quadratic can be printed in a text format.
- **Add two quadratics:** Two quadratics may be added by adding their coefficients for corresponding powers of  $x$ .
- **Slope:** Return the slope of the graph of the quadratic at a specified value of  $x$ .
- **Plot a quadratic:** Return a Matplotlib plot that shows the graph of the quadratic. (This might be tricky!)

Can you think of other methods that would be useful for working with quadratic functions? Be creative!