Section 2.3, problem 28:
\[ G(x) = 0 \implies (x + 2)^2 - 1 = 0 \implies (x + 2)^2 = 1 \implies x + 2 = \pm\sqrt{1} = \pm 1 \]
\[ x + 2 = -1 \implies x = -3 \quad \text{or} \quad x + 2 = 1 \implies x = -1. \]
Conclusion: the zeros of \( G(x) = (x + 2)^2 - 1 \) are \( x = -3 \) and \( x = -1 \) and these are also the \( x \)-intercepts of the function.

Section 2.3, problem 102: The area of the rectangular window is 306 and the dimensions of the window are \( x \) centimeters (width) and \( x + 1 \) centimeters (length). This leads to the equation
\[ x(x + 1) = 306 \implies x^2 + x - 306 = 0 \implies (x + 18)(x - 17) = 0 \implies x = -18 \text{ or } x = 17. \]
The negative solution \( x = -18 \) doesn’t make sense as a width, so the width of the window is \( x = 17 \) and its length is \( x + 1 = 18 \).

Section 2.4, problem 72: Find the quadratic function \( f(x) \) by using the form
\[ f(x) = a(x - h)^2 + k \]
where \((h, k)\) is the vertex. Now use the data to solve for \( a, h \) and \( k \).
(i) We know that the vertex in this case is \((1, 4)\), so \( h = 1 \) and \( k = 4 \). This means that
\[ f(x) = a(x - 1)^2 + 4, \]
and it remains to find \( a \).
(ii) We also know that the graph passes through the point \((-1, -8)\), and this means that \( f(-1) = -8 \) and therefore
\[ a(-1 - 1)^2 + 4 = -8 \implies 4a + 4 = -8 \implies 4a = -12 \implies a = -3. \]
Conclusion: \( f(x) = -3(x - 1)^2 + 4 = -3(x^2 - 2x + 1) + 4 = -3x^2 + 6x + 1. \)

Section 2.6, problem 10: Label the width of the rectangle with \( x \) and the length of the rectangle by \( y \). If we think of \( y \) as the length of the side parallel to the river and \( x \) the length of the side perpendicular to the river, then the total amount of fencing is \( 2x + y \) and therefore
\[ 2x + y = 2000 \implies y = 2000 - 2x. \]
The area of the rectangular field is \( xy \), and since \( y = 2000 - 2x \) we can express this as a function of \( x \) alone:
\[ A(x) = x(2000 - 2x) = -2x^2 + 2000x. \]
The maximum value of the area occurs at the vertex of this quadratic function
\[ x_v = -\frac{b}{2a} = -\frac{2000}{-4} = 500. \]
In words, the area is maximized when the width is \( x = 500 \) meters and the length is \( y = 2000 - 2 \cdot 500 = 1000 \) meters. The maximum area is \( 500 \cdot 1000 = 500,000 \) square meters.